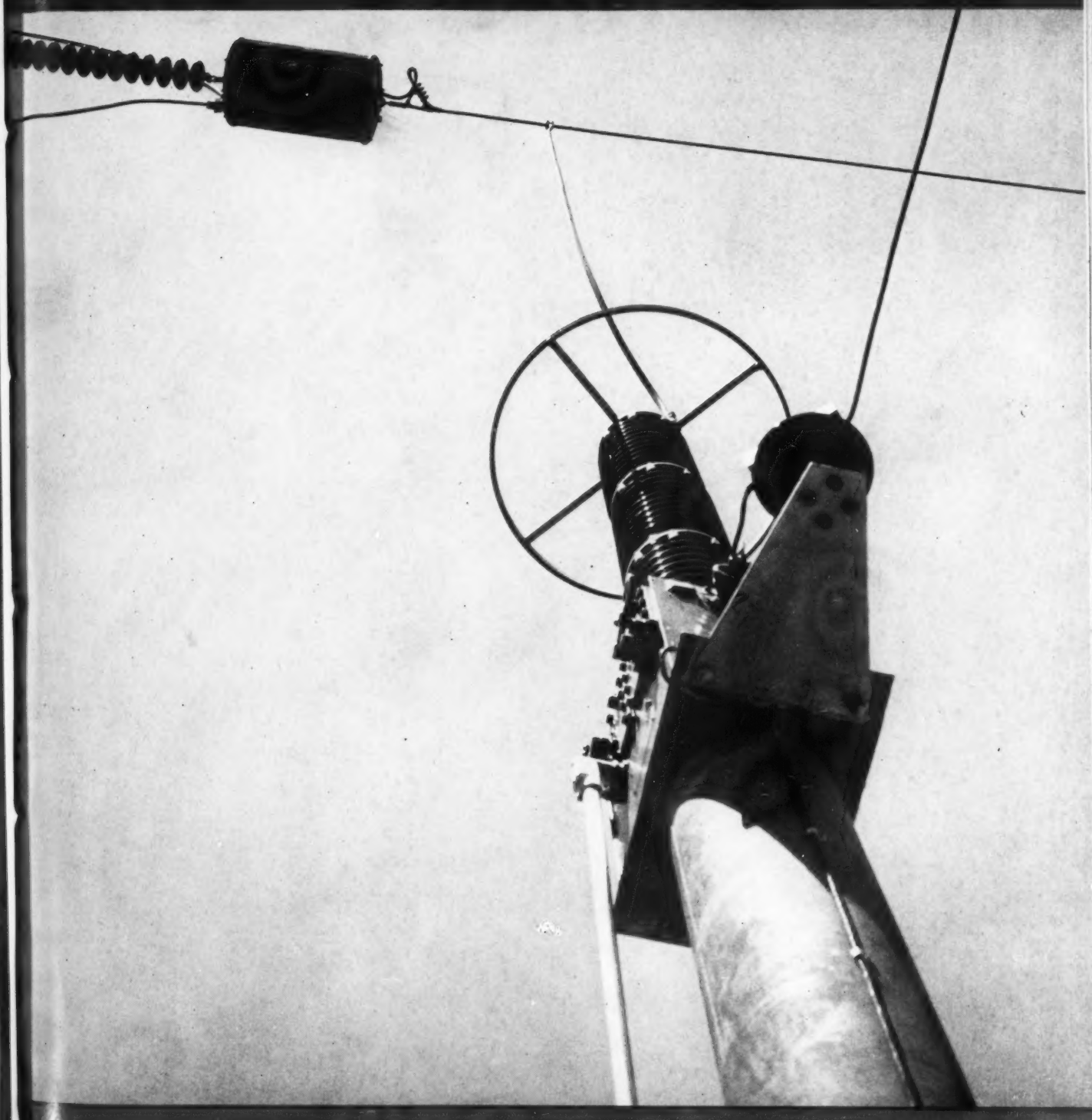
ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED SECTION OF THE U. S.



...w-Hill Co.
...California

AUGUST, 1944

25¢ a Copy

PRICE LEVEL 1935-1939
Housing
Food
Electricity
Still keeping it DOWN
BETTER LIVING AT BARGAIN PRICES
COST OF LIVING
COST OF ELECTRICITY
DOWN DOWN DOWN
Q: What is it that's been going down while other things were
Daily Star
PRICE LEVELS UP 26% SINCE 1939
Cost of Living 59% Higher than in World War I
THAT DOESN'T APPLY TO ELECTRICITY, YOU KNOW!
the rule
exception to

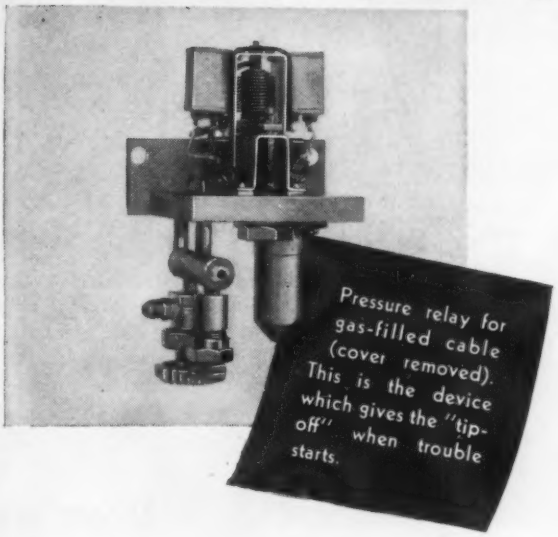
THE EDISON COMPANY advertisements shown here look forward to the time when new appliances will be available. Part of a series currently appearing in newspapers throughout Edison-served territory, these advertisements tell consumers the story of low-cost electricity. They point out that it costs no more to enjoy the advantages of the many electrical services of today than it cost to operate the few appliances of twenty-five years ago!

The continually decreasing cost of electricity always has been a powerful factor in encouraging the more widespread use of electrical equipment and good lighting. By showing that electrical living is a greater value now than ever before, such advertising is helping to cultivate Central and Southern California markets for *future* appliance sales.

SOUTHERN CALIFORNIA Edison

ELECTRICAL WEST (with which is consolidated The Journal of Electricity), August, 1944. Vol. 93, No. 2. Published monthly by the McGraw-Hill Company of California, 68 Post Street, San Francisco, 4, Calif. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. Additional entry as second class matter at the post office at Los Angeles. Printed in U. S. A. Subscription rate in U. S. and U. S. possessions, Canada and Pan-America, $2 per year; all other countries, $3 gold. Single copy 25c.
Copyright 1944, McGraw-Hill Company of California

"Tip-Up" Simplicity in SELF-SUPERVISING CABLE



Like the ice-fisherman's "tip-up" signal, G-E gas-filled cable is constantly on the alert, and remarkably simple in its warning action. The self-supervising feature is obtained without complicating the installation.

This cable (Type GF) enables your maintenance department to get the jump on outages. The savings may be as great as $1000 to $1500 each time the alarm warns of sheath damage.

Repairing your cable at the first signal of a leak or injury costs comparatively little. Knowing about it right away enables the operating staff to forestall emergencies and to maintain service continuity.

Within the solid-cable range, the cost of GF cable is close to that of solid-type cable. At higher voltages, gas-filled cable is less expensive than any other type. Another feature: the technique of handling GF cable is little different from present methods familiar to cable engineers.

For further information, see your local G-E representative. *General Electric, Schenectady 5, New York.*

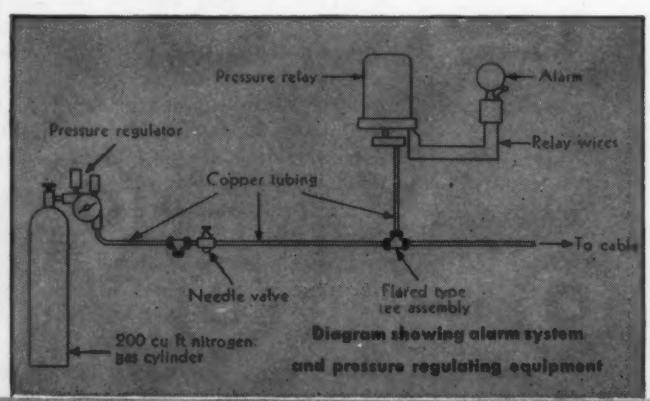


Diagram showing alarm system and pressure regulating equipment

Normal operating pressure of the pure, dry, inert nitrogen is between 10 and 15 pounds per square inch for low-pressure 10-kv to 40-kv lines. On 40-kv to 69-kv lines, the medium pressure is 40 pounds per square inch. In the diagram at left, the simplicity of the equipment is at once apparent. For GF cable lines up to 40,000 feet, a manually operated regulator and alarm system like this need be used at but one end.

GENERAL ELECTRIC

501-22-1200

Buy all the BONDS you can —and keep all you buy

ELECTRICAL WEST

VOL. 93 AUGUST, 1944 NO. 2

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Cover photo: 230-kw coupling capacitor and line trap for FM carrier telephone.

CHANGE OF ADDRESS

Circulation Manager,
Electrical West,
68 Post St.,
San Francisco 4, Calif.

Please change my address

From .....

To .....

Signed .....

People

R. E. Johnson

whose article on electric equipment for airplanes appears on page 51, is Pacific Coast manager of General Electric Co.'s aviation section, attached to the industrial department. A graduate of Stanford University, Johnson went with G-E in 1923 and worked for the company in various positions in Schenectady, Chicago and in the Northwest before going to the Los Angeles office in 1928. His close association with the aircraft industry since 1933 has given him a valuable background in that field. His headquarters are in Los Angeles.

Preview

Change has been going on in the lighting field of the electrical industry, change accelerated and extended because of the urgency of war requirements. The change itself is interesting but what the change may mean after the war in the reconversion of America to peacetime industry and commerce is more important.

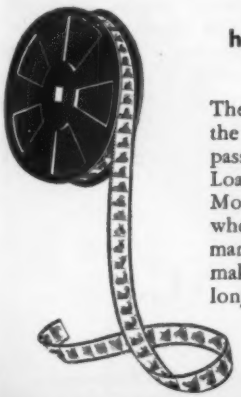
Customary for many years has been to devote a large part of the September issue of ELECTRICAL WEST to lighting and to point trends and methods which may aid those who design lighting to make use of better ideas and techniques in the forthcoming lighting season. It will be so again next issue, the 1944 lighting number.

While the examples used to illustrate methods may be drawn largely from the war industry field of application, the principles involved will be those which may be adapted to advantage in any future application requiring a similar result. Light is no partisan, it shines on the just and the unjust, the war weapon and the implement of peace. Whether the war ends or extends, these methods of lighting will prove useful.

IT'S A FACT—already over eleven million of these helpful booklets have been needed for free distribution to refrigerator users—enough for one out of every three families in the U. S.! By distributing these booklets to users of all makes, Frigidaire dealers are rendering a much appreciated wartime service.

And what is the result? Simply this—an enormous backlog of good will that will be reflected in expanded sales opportunities for Frigidaire dealers in the great peacetime future that lies ahead.

Requests are Still Pouring In! The demand for "101 Refrigerator Helps" still mounts. Frigidaire Dealers everywhere are using it to maintain their identity—offering it in window displays, in local newspaper and radio advertising. No booklets of this kind have ever received wider distribution. None has ever been more enthusiastically received by refrigerator users.

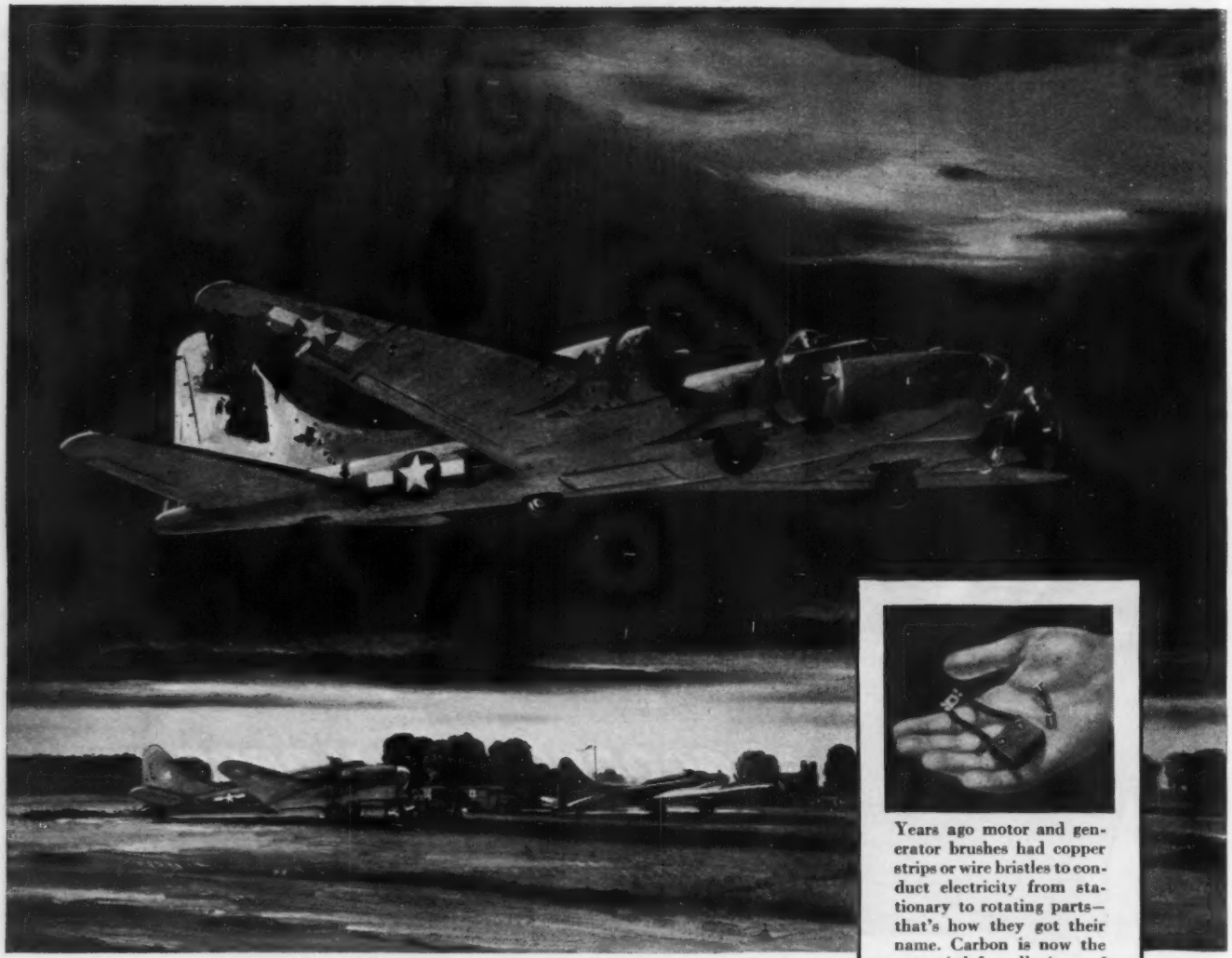


Over ½ million people have seen Frigidaire Wartime Refrigerator Film

The 30-minute talking film, "How to Get the Most out of your Refrigerator," has passed the ½ million showing mark. Loaned without rental charge by General Motors, it is enthusiastically received wherever it is shown. In an entertaining manner, it offers suggestions on how to make your refrigerator serve better and last longer. It is not an advertising picture.

For Excellence ARMY-E-NAVY *in War Production*

FRIGIDAIRE
Division of
GENERAL MOTORS
DAYTON 1, OHIO • LEASIDE 12, ONTARIO
Peacetime builders of
ELECTRIC REFRIGERATORS • RANGES • WATER HEATERS
HOME FREEZERS • ICE CREAM CABINETS
COMMERCIAL REFRIGERATION • AIR CONDITIONERS
BEVERAGE, MILK, AND WATER COOLERS



Years ago motor and generator brushes had copper strips or wire bristles to conduct electricity from stationary to rotating parts—that's how they got their name. Carbon is now the material for all sizes of these brushes.

THEY HELP BRING THE GIANTS HOME

ONE OF the "little things" that are contributing greatly to the safety and welfare of our fighting men, is a special kind of carbon brush used in high-altitude planes. These brushes are essential to the generators and motors that supply energy for the radios, firing apparatus, gun turrets, bomb bay doors, landing gear, and other equipment of the planes. A heavy bomber has more than 40 of these devices requiring brushes.

Ordinary brushes disintegrate in a few minutes at altitudes where the air is "thin" and dry. A brush that would be dependable from take-off to ceiling and would have a life of 100 hours or more—had to be found. It came from the laboratories of NATIONAL CARBON COMPANY, INC., a Unit of UCC.

Carbon is useful in many other ways to Americans at war. Therapeutic lamps, which employ the carbon arc, are helping to restore health to sick and wounded men. Activated carbon in gas masks, by absorbing toxic vapors, is ready to save lives.

In the two-way radio telephone—the walkie-talkie and the handy-talkie—and in hearing aids for the deafened, carbon has another role. Carbon is essential in the small, powerful batteries that are used in these devices.

▼

Teachers, designers, and operators of electric motors, generators, and rotary converters are invited to send for "Modern Pyramids." This is a series of pamphlets containing practical suggestions on the performance, characteristics, operation, and application of carbon, graphite and metal-graphite brushes. Write National Carbon Co., Inc., Cleveland 1, Ohio, Dept. 17H

★ BUY UNITED STATES WAR BONDS AND STAMPS ★

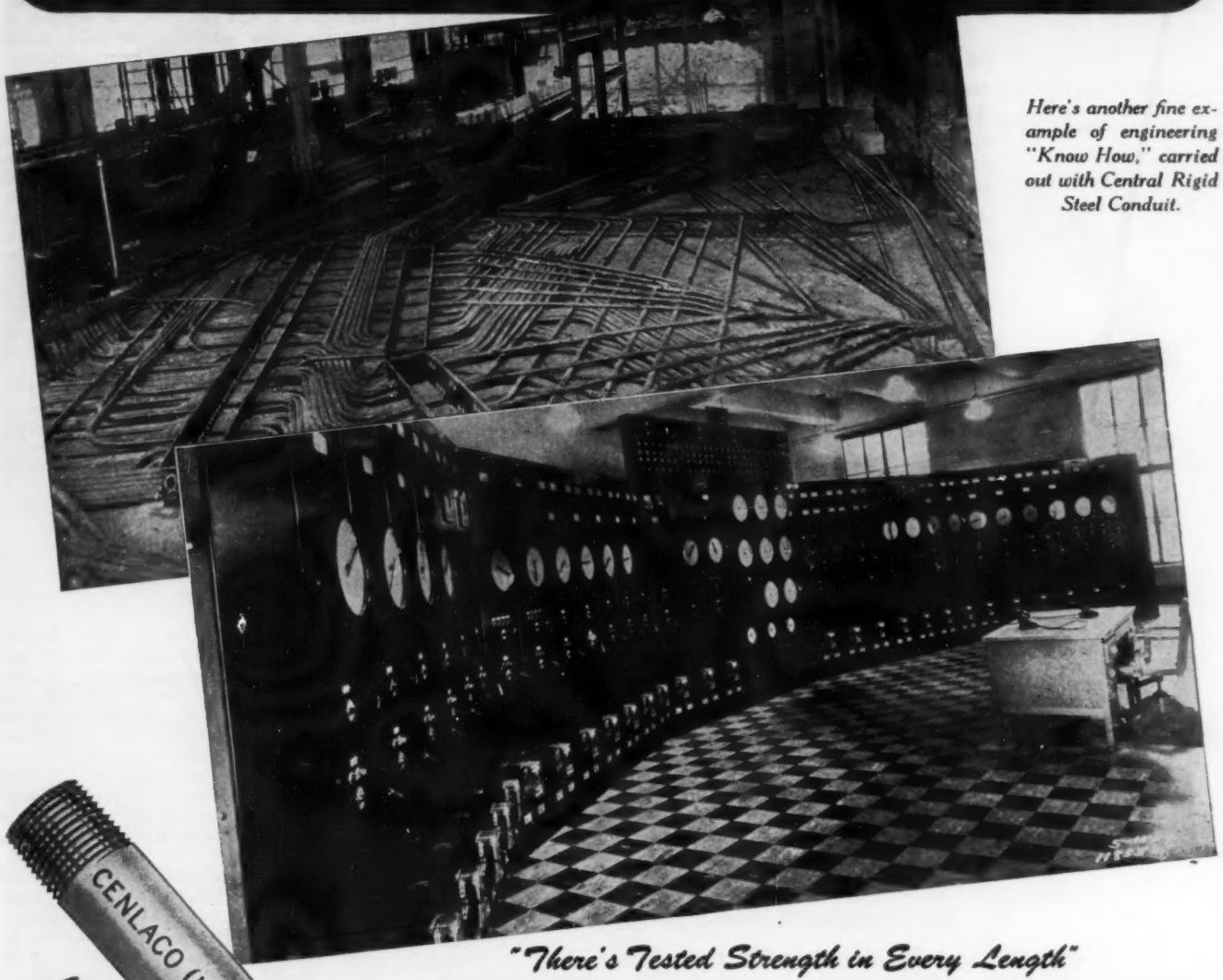
The trade-mark "National" distinguishes products of National Carbon Company, Inc.

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation

CARBON PRODUCTS DIVISION, Cleveland 1, Ohio UCC New York, Pittsburgh, Chicago, San Francisco

How it was done with
CENTRAL RIGID STEEL CONDUIT



Here's another fine example of engineering "Know How," carried out with Central Rigid Steel Conduit.

"There's Tested Strength in Every Length"

SPANG-CHALFANT

Division of The National Supply Company

Executive Offices: Grant Building, Pittsburgh, Pa.

District Offices and Sales Representatives in Principal Cities

It's just *GOOD BUSINESS* to keep appliances on the job for the duration . . .

So get back of the National Appliance Conservation Plan — now! Another good idea to help keep appliances on the job *where they are needed* is the Proctor "Swap Plan." (A few booklets describing the Swap Plan still available on request.)

BETTER CARE — MANUFACTURER • WHOLESALER • CONSERVE • Electric Servants • DEALER • UTILITY — LESS REPAIR

GOOD BUSINESS after the war . . .

Get ready for good post-war business, because *Proctor will be ready* with surprise features in appliance construction, new wrinkles in appliance merchandising! Meanwhile, let's all *"Back the Attack"* with War Bonds.

PROCTOR

NEWSMAKER IN APPLIANCE MERCHANDISING

PROCTOR ELECTRIC COMPANY—*DIVISION*, PROCTOR & SCHWARTZ, INC., PHILADELPHIA 40, PA.

LETTERS
to the editor

To the Editor:

I was tempted to write you when I first saw Mr. Roy Burnett's article on *Phase Relation of Transformers* in the March issue, but decided that you would probably receive many other letters. When I ran across the correction, however, in the July issue, I could not refrain from letting you know that this article is still incorrect. It seems to me that this entire subject is confusing enough to the average person without deliberately publishing erroneous information in a magazine with the reputation which ELECTRICAL WEST formerly had.

To be specific, three of the diagrams shown are still wrong; the second one from the top, on page 69 is wrong as well as the first two diagrams shown on page 70. Near the top of page 70, it states that when windings are wound in the same direction, this is known as "additive" polarity. My text books always call this "subtractive" polarity.

The short extract taken from Mr. F. V. Gillum's article sounds very good and it is too bad Mr. Gillum's article was not published in full in place of the incorrect correction which was published.

Attached is a copy of ASA Bulletin C6.1-1944, published by the American Standards Assn., which gives the latest American Standards on this subject, on pages 31 through 37. This may be of interest to the author.

F. W. Bush.

Wauwatosa, Wis.

☆

To the Editor,

The second story by Mr. Roy Burnett, published in your July issue does not meet with approval by many readers in this territory. The author understands the subject and can, no doubt, use vector analysis satisfactorily himself, but his article does not conform to standard practice as used by utility and design engineers. In order to synchronize generators, phase transformer banks, connect protective relays and design special networks, a standard vector system must be followed.

Vectors are a mystery to some and this article will be read and studied for a greater understanding of this subject. My point is that such an article should be written according to standards as studied in college and approved by NEMA.

Let me give two or three examples of points in the article with which I disagree:

Item 1, page 69—The additive polarity diagram is not clear. If the arrows represent current, then they are wrong because instantaneous current flows in on polarity and out on polarity.

Item 2, page 69—The vectors on this page are voltage vectors and it is confusing to put arrows on voltage vectors. At the top of the page the vectors are for a subtractive bank, not an additive bank and arrows should be left out.

The second vector from the top of page 69 is hopeless because it refutes the author's statement that the same phase-angle or a phase-angle of 180° must occur on each transformer. Note that voltage CB is either in-phase, or 180° out of phase with secondary voltage CB or BC in the vector dia-

(Continued on Page 10)

A modern, low-cost method of centralizing motor control and combining it with an AIR-COOLED Transformer has long been requested by Plant Engineers.

Now—it's here! . . . an air-cooled Power Center as acceptable in appearance as it is in performance. No need to hide *this* unit in a vault . . . either for looks or for safety. Install it anywhere indoors without fireproof vaults.

A Westinghouse Power Center is a completely co-ordinated unit substation, factory-assembled and tested, and delivered to your plant ready to be connected for service. It consists of:

A HIGH-VOLTAGE SECTION (15,000 volts or less)
A TRANSFORMER SECTION (2,000 kv-a or less)
A LOW-VOLTAGE SECTION (600 volts or less)

By installing this Packaged Power *at* load centers, you'll save as much as 75% of the copper required for secondary runs and improve voltage regulation. Ask your Westinghouse representative for details. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., Dept. 7-N. J-70431

IT'S HERE

A SMART LOOKING, NEW

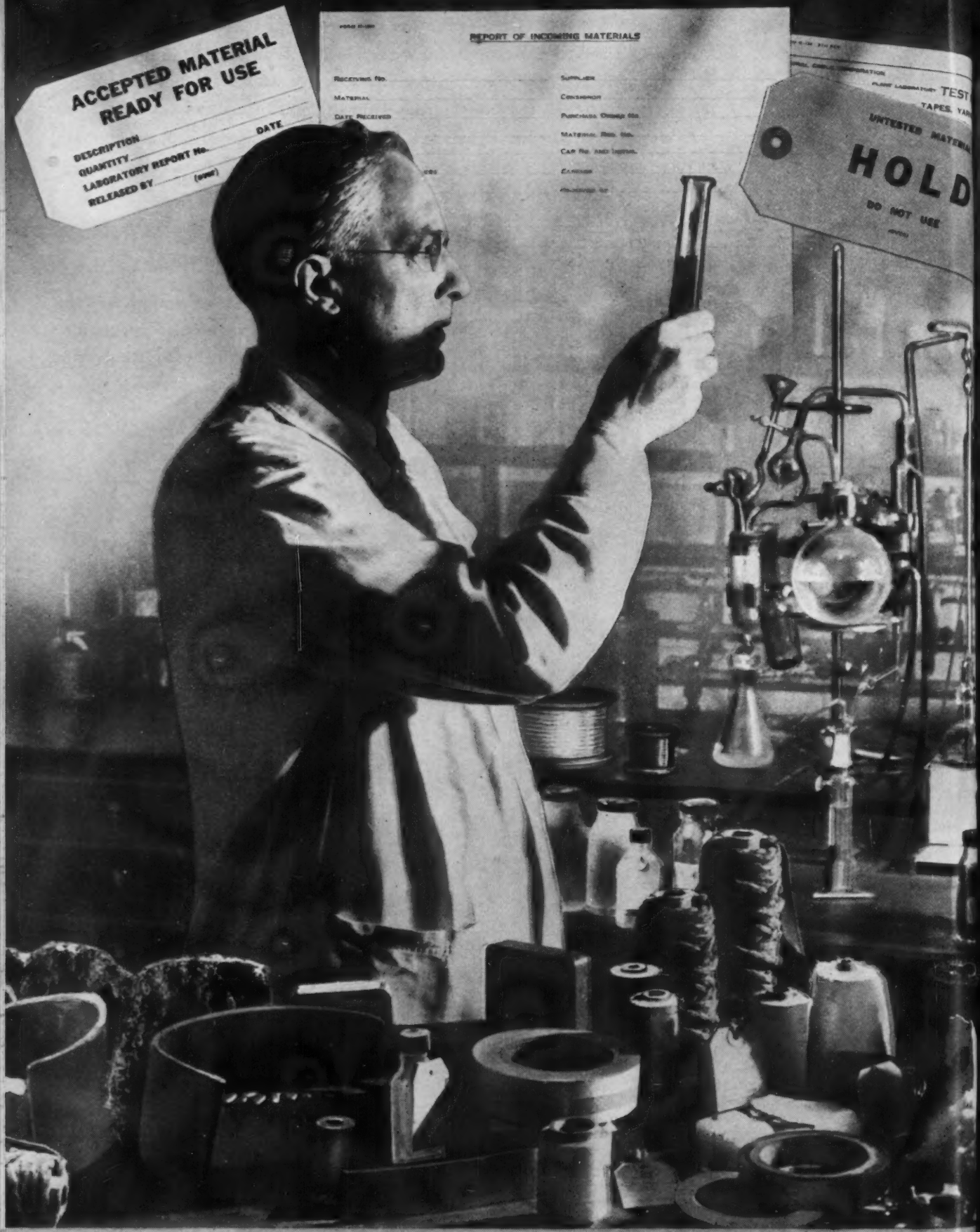
Air-Cooled **POWER CENTER**

Westinghouse

PLANTS IN 25 CITIES OFFICES EVERYWHERE

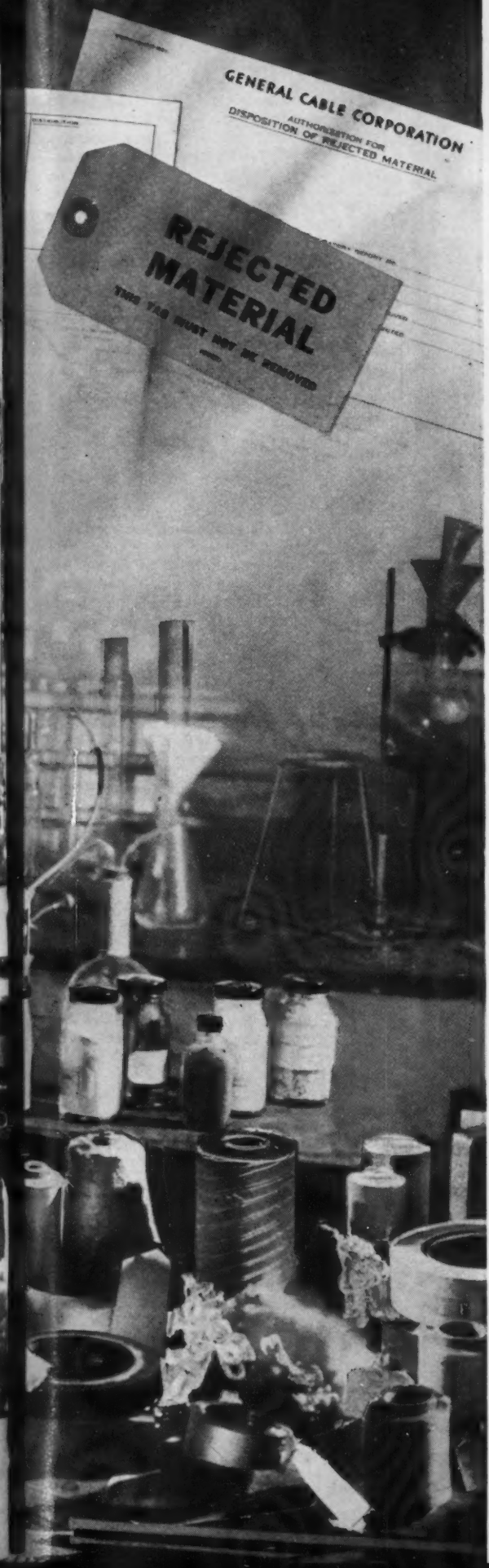
PACKAGED POWER

QUALITY CONTROL . . . . . BY GENERAL



Literally hundreds of materials—among them metals, fabrics, lacquers, asphalts, synthetic polymers—are used in making modern wire and cable. The chemical, physical, metallurgical tests of all incoming raw materials for each plant are "double-checked" in the Control Testing Laboratory located at that plant. All 9 of these laboratories operate, however, under direct and close supervision of the General Cable Research Laboratory—the largest, it has been said, "in the world" devoted exclusively to wire and cable research.

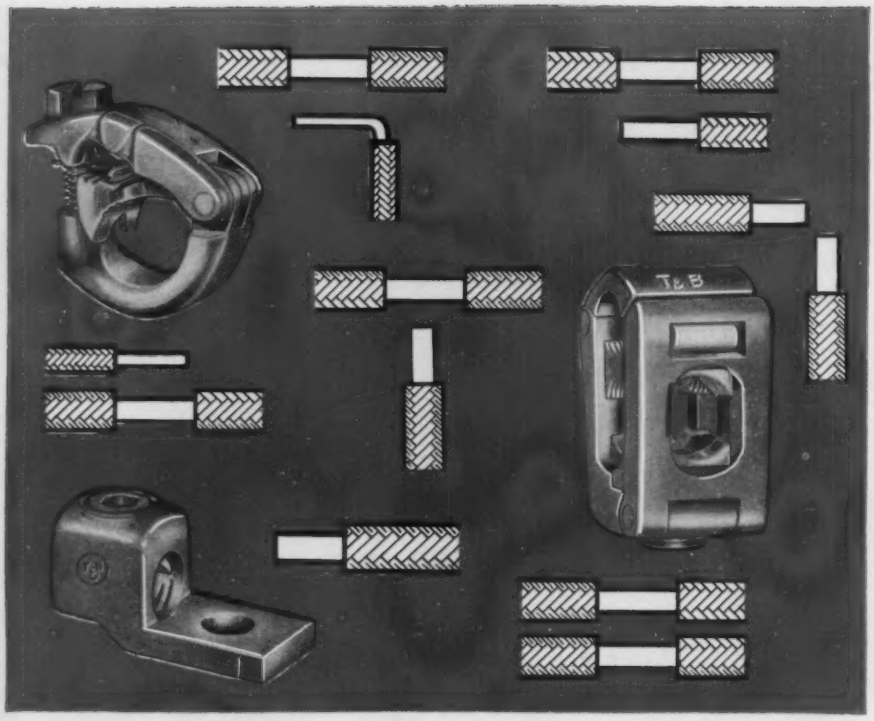
CABLE'S OWN "BUREAU OF STANDARDS"


GENERAL CABLE CORPORATION
AUTHORIZATION FOR DISPOSITION OF REJECTED MATERIAL
REJECTED MATERIAL
THIS TAG MUST NOT BE REMOVED

Assurance of standardized quality in the electrical wire and cable products supplied by General Cable starts with our firm control of raw materials. To insure absolute uniformity at all 9 manufacturing plants, each material used is accepted or rejected by the "Control Testing Laboratories" situated in each plant, to specifications established by the General Research Laboratory at Bayonne. The time of an entire Bureau of the General Research Laboratory is devoted to the setting of these standards and the devising and supervising of uniform tests to enforce them. Under such a program one does not have to hope for or demand quality control — one gets it.

GENERAL CABLE CORPORATION

Manufacturers of Bare and Insulated Wires and Cables for Every Electrical Purpose



WHY NOT *SIMPLIFY* ALL YOUR HOOK-UPS WITH THESE FEW

T&B LOCK-TITE

PRESSURE *(Solderless)* CONNECTORS

A SMALL assortment—a handful—of these Approved T&B Lock-Tite Pressure Connectors will take care of practically all the lugging and tapping you are ever likely to do.

Each connector takes several overlapping cable sizes up to 1000 MCM, and handles any type; solid. stranded, flexible, extra-flexible, hemp-core, rod or tubing.

Being salvageable, T&B Lock-Tites can be used over and over again.

Being solderless, the electrician on the job finds them simple to install. He is confident of a perfect electrical and mechanical connection, even under continuous vibration.

It is easy to see how this T&B Lock-Tite Line simplifies your stock and inventory problems.

Ordering them is simple, too. Your nearby T&B Electrical Wholesaler carries them in stock.

Write Dept. EW-8 for Maintenance and Repair Booklet giving all the dope on this Lock-Tite Line.

The Thomas & Betts Co., Incorporated
103 N. Santa Fe Avenue
Los Angeles 12, Calif.

The Thomas & Betts Co., Incorporated
542 Natoma Street
San Francisco, California

Paul Douden & Co.
1645 Wazee Street
Denver 2, Colorado

F. A. Strohecker
301 Eyres Bldg.
2207 First Ave., S.
Seattle 4, Washington

T&B

THE THOMAS & BETTS CO.
INCORPORATED
manufacturers of electrical fittings since 1899
ELIZABETH, NEW JERSEY

gram, but primary voltage CB on the transformer diagram matches either secondary voltage AB or BA. The same is true with the rest of the vector.

On page 71, it is stated that an arbitrary clockwise phase rotation is assumed, but all vectors are drawn counter-clockwise and the third vector on page 69 is drawn according to subtractive polarity standards. The same comments are true for the fourth vector on page 69, that is, it is drawn as a subtractive polarity bank, vectors counter-clockwise and arrows are to be left out.

Item 3, page 70—The arrows are again confusing and the statement that when the two windings are wound in the same direction it is known as additive. According to standard diagrams such windings are subtractive. The first three vectors on page 70 are incorrect, but the fourth is correct. Perhaps the last vector is correct, but it isn't very clear with so many arrows.

Item 4—The last paragraph states, "The neutral conductor will carry the unbalanced current brought about by connected loads of different values *across* the different phases." Such a statement is not correct. From the diagrams one can only assume the author meant secondary load unbalance *across* the delta or wye phase connections. Actually the only current that can flow in a neutral must be from load connected to the neutral and not from unbalanced phase loadings.

Many men have a slight working knowledge of vectors and are always looking for more information. Most of these men are not sufficiently interested in vectors as a subject to study textbooks but they do study and read the articles and it is for the benefit of these readers that I call attention to the errors mentioned.

J. H. Vivian
Protection Engineer
Southern California Edison Co.

Los Angeles, Calif.

☆

To the Editor:

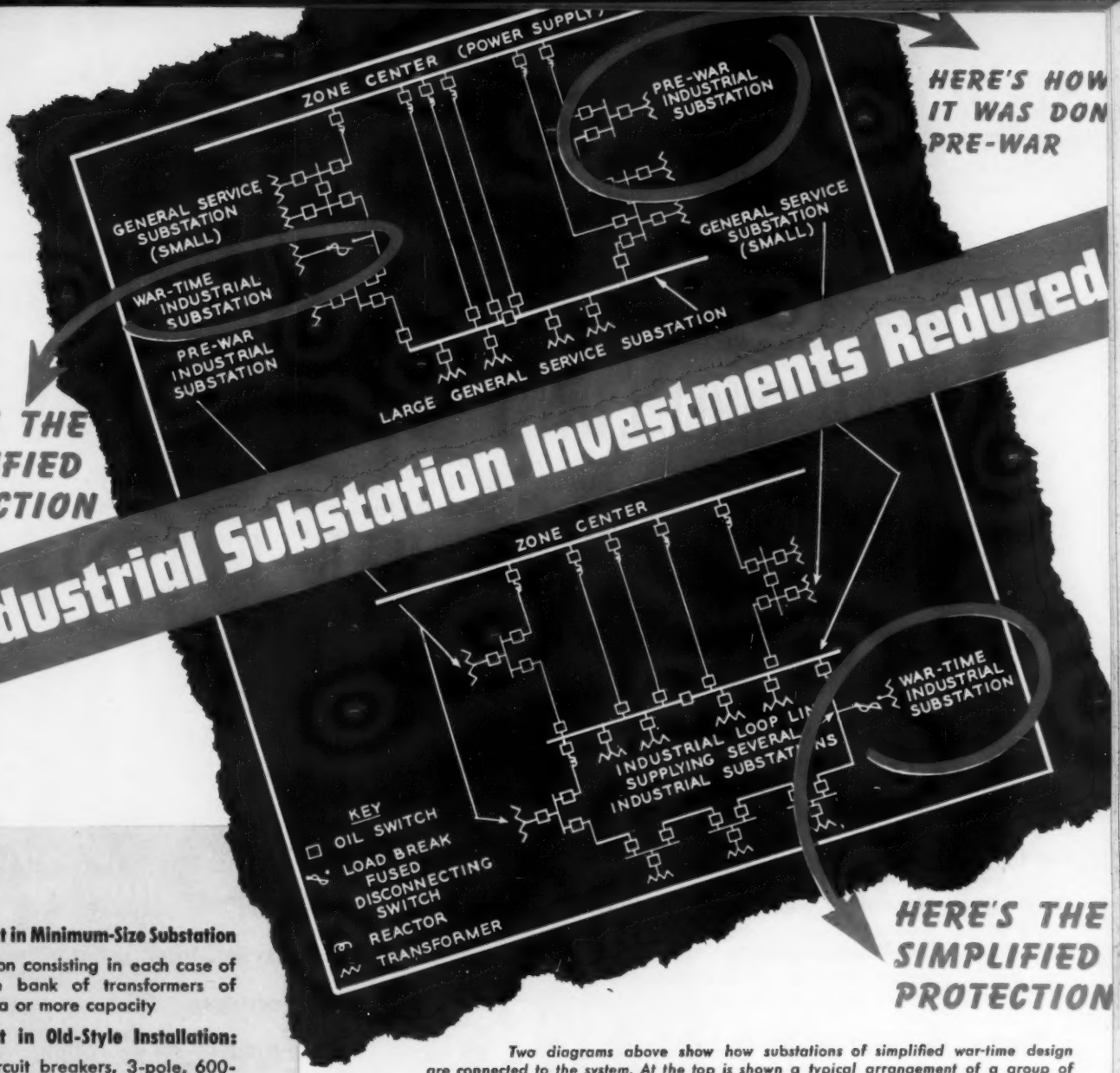
. . . The news item on page 91 of the July issue of ELECTRICAL WEST is quite inaccurate, for it was the customers of the Portland General Electric Co. who received the $807,000; the Northwestern customers receiving the smaller sum. Reference to any of your previous statistical numbers will show that Portland General Electric Co. is the larger of the two concerns and it follows that an 86% reduction in tariff billing should result in a larger cash credit to the customers of the Portland General Electric Co.

May I take this opportunity of congratulating you as editor of ELECTRICAL WEST on the very fine story, *Kilowatt-Hours Pooled for War*, written by Walter C. Heston for the March issue. The company had a number of reprints made and I have been distributing them throughout the territory served by Portland General Electric Co. I find that there is quite a demand among our customers, particularly those of the service organizations such as Kiwanis, Rotary and Lions clubs, for information concerning the power pool, and Mr. Heston's story provides the information desired in a way that business men can read and understand, even though they have no particular knowledge of electrical engineering.

Fred G. Hodge
General Division Manager
Portland General Electric Co.

Portland, Ore.

Industrial Substation Investments Reduced



Two diagrams above show how substations of simplified war-time design are connected to the system. At the top is shown a typical arrangement of a group of three general service substations and three industrial substations; one of which is of war-time design. The industrial substations have a source of power either at the zone center or a general service substation. The lower diagram shows an arrangement with industrial substations supplied by a loop out of a large general service substation. Note simplicity of connections for war-time substation.

Equipment in Minimum-Size Substation

Substation consisting in each case of a single bank of transformers of 1000 kva or more capacity

Equipment in Old-Style Installation:

3 oil circuit breakers, 3-pole, 600-amp, 15-kv, 250,000-kva interrupting capacity

18 S.P.S.T. manually-operated disconnect switches

9 current transformers

3 potential transformers

2 sets of differential balance relays or 6 reverse power relays

3 overload relays for transformer

1 control battery with charging generator

Auxiliary relays, miscellaneous wiring, and other devices

1 bus structure

Equipment in New-Type Installation:

1 set of load-break fused disconnecting switches

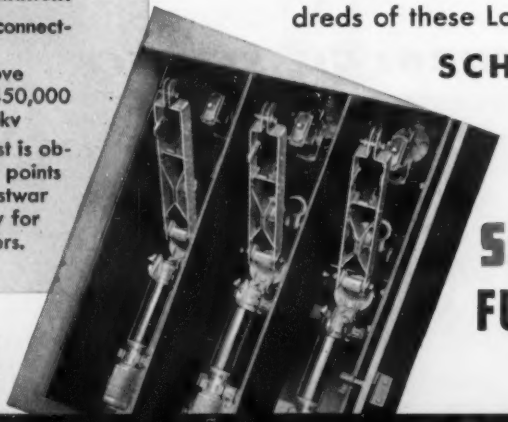
1 supporting structure for above

3 power fuses, 300,000 to 450,000 kva interrupting capacity, 15 kv

The saving in installation cost is obvious. The above comparison points the way to a probable postwar policy that will be satisfactory for the vast majority of customers.

S&C Load Break Disconnects are equipped with an Interrupter Unit so that the circuit is opened without arcing at the main switch contacts. Short circuit protection is provided by the S&C Type "SM" Power Fuses. The accompanying comparison of equipment (at left) clearly indicates the reduced investment. Our engineers are ready to make recommendations based on experience gained in supplying hundreds of these Load Interrupter Fused Disconnect Switches.

SCHWEITZER & CONRAD, Inc.
4435 RAVENSWOOD AVE. • CHICAGO, 40
Supplied in Canada through Powerlite Devices, Ltd., Toronto, Ont.



Close-up of one bay of cabinet-enclosed Load Interrupter Disconnect Switch and Power Fuse Assembly with door open, showing Load Interrupter Switch and Fuse Combination.

S&C LOAD INTERRUPTER FUSED DISCONNECTS

YOU WOULDN'T HAVE WANTED IT ANY OTHER WAY

Billions of feet of "U. S." wires and cables have been shipped to our fighting fronts . . . wires and cables badly needed by you here at home . . . but indispensable to our Armed Forces.

Much of that huge output was Laytex Wires and Cables, in heavy demand on the domestic front. But you understood . . . you did not question the right of our Army and Navy to every foot of it.

It was natural that Laytex should be required for many military services — communication, signaling, data transmission, searchlight and gun control. For Laytex is an unusual wire development. It is lighter and more

flexible than any other wire of the same capacity. It is especially valuable for military uses in swamps, deserts, rough terrain — even under-water services.

The men and women of the Bristol, R. I. plant of the U. S. Rubber Company, makers of Laytex Wires and Cables, have been given the Army-Navy "E" for a job well done. In expressing appreciation to them we are not unmindful of the share you, our customers, have had in this effort . . . you who have so willingly set aside plans and made the best of it, until Laytex is again available. In the final analysis, you wouldn't have wanted it any other way.

SERVING THROUGH SCIENCE

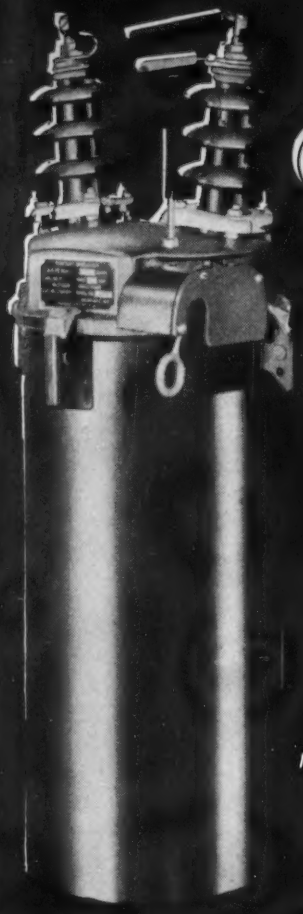
UNITED STATES RUBBER COMPANY

1230 Sixth Avenue • Rockefeller Center • New York 20, N. Y. • *In Canada:* DOMINION RUBBER CO., LTD.

Listen to the Philharmonic-Symphony program over the CBS network Sunday afternoon, 3:00 to 4:30 E.W.T. Carl Van Doren and a guest star present an interlude of historical significance.

KYLE OIL CIRCUIT BREAKERS

Are Easy to Handle • Easy to Install • Easy to Maintain



RATINGS OF
KYLE CIRCUIT BREAKER

BECAUSE Kyle Oil Circuit Breakers make use of standard transformer construction, are held in place by standard transformer mountings, are serviced with standard transformer tools, their installation on your lines is no problem at all.

With no terminal in the bottom of the tank . . . an important safety factor . . . the Kyle Circuit Breaker stands on its own base in the storeroom and is easily handled in your service truck. The all metal tank gives a ruggedness that makes careful handling unnecessary.

Kyle Oil Circuit Breakers are thoroughly tested and inspected at the factory. They are delivered ready to use. Because the bushings at the top are the only external live parts, the breaker can be safely mounted any place on the pole . . . in fact, direct pole mounting for single phase installation is recommended. If crossarm mounting is desired, the A.I.E.E.-N.E.M.A. standard transformer crossarm hanger may be used.

Typical single and three phase installations are illustrated. The breaker is connected in series with the phase wire, with the terminal marked "line" on the course of power. A grounding lug is provided at the bottom of the tank.

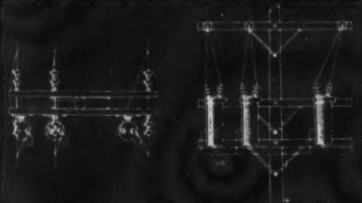
Servicing of the breaker is made easy by the fact that the entire assembly is removed from the breaker case as a unit.

When you combine these important installation and service features with the fact that Kyle Oil Circuit Breakers, with their dependable hydraulic timing, can be counted on for years of reliable service, it is not hard to understand the big swing to Kyle in these days when manpower is at a premium.

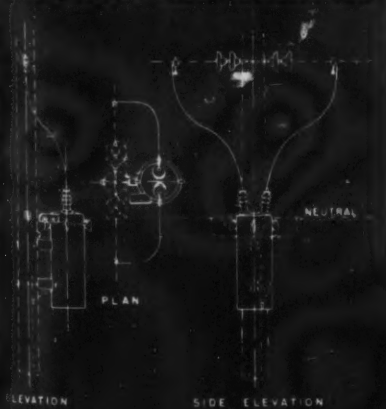
KYLE OIL CIRCUIT BREAKERS REQUIRE LITTLE MAINTENANCE

Kyle Oil Circuit Breakers will give many months of automatic protection to your lines with a minimum of attention.
In normal operation, maintenance may be limited to six months periods, or after 75 operations. At such intervals it is merely necessary to check the oil level . . . float gauge is located on the cover; test the dielectric strength of the oil; check contacts for pitting and burning.

YPICAL THREE PHASE INSTALLATION

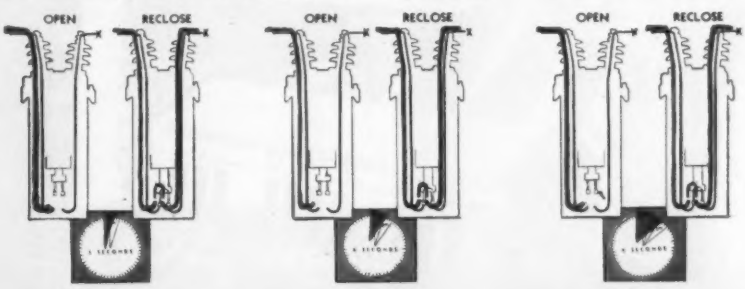


YPICAL SINGLE PHASE INSTALLATION



HOW THE KYLE OIL CIRCUIT BREAKER OPERATES

The Kyle Oil Circuit Breaker is so designed that each opening shot is fast and each closing requires an interval of three seconds.
On temporary faults the breaker will operate one, two or three times as may be required, resetting itself for a complete cycle of operations, but will lock out on the fourth operation should the fault be permanent.
When the fault condition on the line is corrected the breaker can be manually reclosed by raising the handle to the up position.



3 SECONDS 6 SECONDS 9 SECONDS

KYLE CORPORATION

SOUTH MILWAUKEE, WISCONSIN

TO ITS STANDARD CARRIER-CURRENT LINE

ANY combination of carrier-current services you need...

MAY BE MADE FROM 77 DIFFERENT G-E STANDARD "PANEL UNITS"

Times standardized "panel units"—designed and co-ordinated against a background of more than 10 years' practical experience—are General Electric's answer to any carrier-current problem.

Compact, efficient, and uniform in high quality and engineering, each combines electrically and mechanically with one or more of the other 77 units—and with standard cabinets of convenient size for indoor or outdoor installation.

No other carrier equipment offers such flexibility in design or function. Whether your requirements are met by an assembly the size of a suitcase or the layout equipment at the right, future needs for more or different carrier-current services will be accommodated easily and economically.

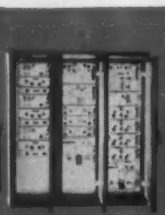
Major carrier functions include pilot relaying, transferred tripping, supervisory control, telephony, telemetering and automatic load control.

General Electric engineers will be glad to discuss your needs, and to help you select the most suitable combination. Write to Electronics Department, General Electric, Schenectady, New York.

* Time is "The World Today" every evening except Saturday at 6:45 E.W.T., over CBS. On Sunday Refer to the 8-4 "All Out Endeavor" at 10 P.M. E.W.T. over NBC.

GENERAL ELECTRIC

GENERAL ELECTRIC CARRIER-CURRENT PANEL UNITS



GENERAL ELECTRIC HAS PLANNED AND BUILT MORE CARRIER-CURRENT EQUIPMENT THAN ALL OTHER MANUFACTURERS COMBINED

CARRIER CURRENT
THE NERVE NETWORK OF THE POWER SYSTEM

ON THE LINE APRIL 29

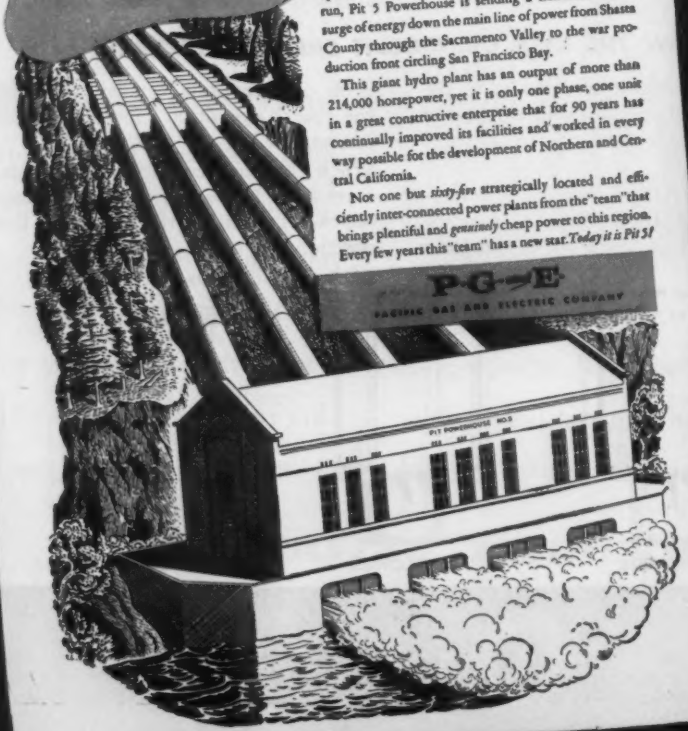
PIT 5 POWERHOUSE

Spic and span as a newly launched ship on her maiden run, Pit 5 Powerhouse is sending a tremendous new surge of energy down the main line of power from Shasta County through the Sacramento Valley to the war production front circling San Francisco Bay.

This giant hydro plant has an output of more than 214,000 horsepower, yet it is only one phase, one unit in a great constructive enterprise that for 90 years has continually improved its facilities and worked in every way possible for the development of Northern and Central California.

Not one but *sixty-five* strategically located and efficiently inter-connected power plants from the "team" that brings plentiful and *genuinely* cheap power to this region. Every few years this "team" has a new star. *Today it is Pit 5!*

P·G·&·E
PACIFIC GAS AND ELECTRIC COMPANY



PIT 5 HAS FIRST FM CARRIER TELEPHONE

- It is particularly fitting that FM carrier should make its "maiden run" in connection with this power-plant which represents the latest and best in design and operation.

- When Pit 5 went on the line April 29, 1944, G-E FM carrier went on the line with it. Type KCA-33 2-frequency duplex, illustrated in lower right corner of opposite page, was the equipment installed.

GENERAL ELECTRIC

G. E. HAS ADDED FM

As leader in the fields of power-line carrier and of frequency modulation, it is natural that General Electric should be first to investigate possible contributions of FM to carrier current and to develop the advantages of FM at low frequencies and narrow swing.

ACTUAL operating data, supporting theoretical studies and laboratory tests, indicate that FM offers:

1 Better discrimination against noise — or longer channels with the same carrier power.

2 More channels — by permitting more frequent duplication of channel frequencies.

3 Uniform receiver output under wider variations in line conditions — as a result of flat automatic carrier signal limiting in the receiver.

Of particular interest to present carrier users is the fact that G-E FM carrier telephone coordinates with G-E AM carrier telephone in the following ways:

1 Uses same frequency range — 50 kc to 150 kc.

2 Requires same band width — 6 kc.

3 Provides the same high-grade speech quality.

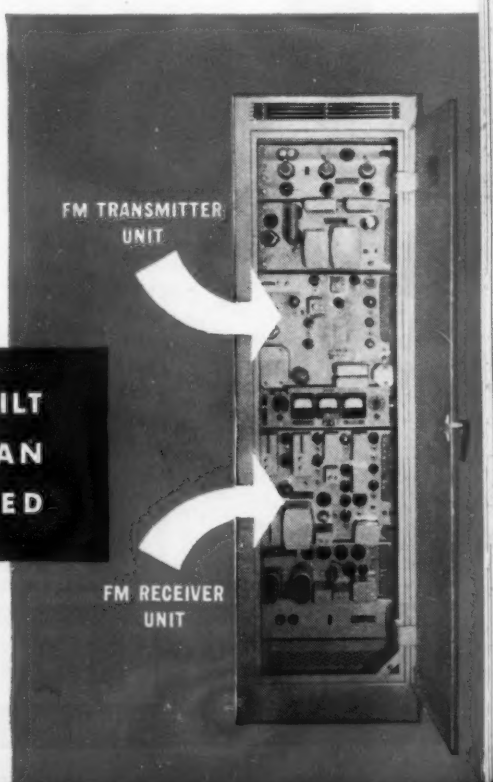
4 Uses same coupling capacitors, line traps and all other auxiliary equipment.

5 FM transmitters and receivers are manufactured in unit panels for mounting in standard G-E rack-and-panel assemblies.

General Electric engineers will be glad to discuss your carrier current needs; and to help you select the most suitable combinations. *General Electric, Schenectady, New York.*

• *Tune in General Electric's* "The World Today" *and hear the news from the men who see it happen, every evening except Sunday at 6:45 E.W.T. over CBS network. On Sunday evening listen to the G-E* "All Girl Orchestra" *at 10 E.W.T. over N.B.C.*

Type KCA-33
2-frequency
duplex assembly



GENERAL ELECTRIC HAS PLANNED AND BUILT MORE CARRIER-CURRENT EQUIPMENT THAN ALL OTHER MANUFACTURERS COMBINED

151-C3-6020

CARRIER CURRENT

THE NERVE NETWORK OF THE POWER SYSTEM

KLEIN QUALITY

This book on the care and safe use of tools will be sent on request.

THREE-QUARTERS of a century ago, pioneers who strung the first electric lines recognized that the tools then available were not good enough for the exacting service their work demanded. They came to the little forge shop of Mathias Klein with requests for specially made tools, high in quality—better able to stand punishing service. The small forge shop has grown into a large plant—specifications have changed to meet the new demands of a field that is noted for its improved technology—but the ideal of high quality that Mathias Klein built into his first pair of hand forged pliers is the ideal that is still back of all tools and equipment carrying the name Klein. Today, Klein tools and equipment remain the first choice of linemen—electricians—good workers everywhere.

ASK YOUR SUPPLIER

Foreign Distributor: International Standard Electric Corp., New York

Mathias KLEIN & Sons
Established 1857 Chicago, Ill., U.S.A.
3200 BELMONT AVENUE, CHICAGO 18, ILLINOIS

Since 1857

BOOKS

you may want

THE TECHNIQUE OF RADIO DESIGN, by E. E. Zepler, 325 pages, 260 figures, 5½ x 8½, John Wiley & Son, $3.50.

Although the title to this book might indicate otherwise it is written around the design of radio receivers only. The author's efforts in this respect are well spent for the book not only deals with the fundamental design procedures but has a considerable emphasis placed on problems where "unexpected complications occur, where a circuit behaves in a manner not readily predicted from the circuit diagram."

Chapter titles include: Undesired Feedback, Hum and Spurious Beats, Distortion, Parasitic Resonances, Fault Finding and Routine Measurements.

Derivations of formula and complicated mathematics are avoided as much as possible for this type of work.

The author concerns himself only with the fundamental circuit since nothing is included of a design nature on limiters, discriminators for FM receivers and phono circuits with which, of course, the present and postwar engineer must concern himself, nevertheless the book is a valuable addition to the literature of radio design—K. N.

TIME BASES, by O. S. Puckle 216 pages, 124 figures, 5½ x 8½, John Wiley & Sons, $2.75.

The use of the cathode ray oscilliscope for the observation of a phenomenon with respect to some linear or non-linear time base has become widespread in the fields of mechanics, ballistics, navigation, internal combustion engines, as well as communication and the electrical fields.

This book surveys the various types of circuits used for obtaining time bases for both the electrostatic and electromagnetic oscilliscope. Most of the book rightly deals with linear sweeps developed by others. Methods of synchronization, and utilization are dealt with briefly.

A discussion of the cathode ray tube and factors important in its use are discussed in a 60-page appendix.

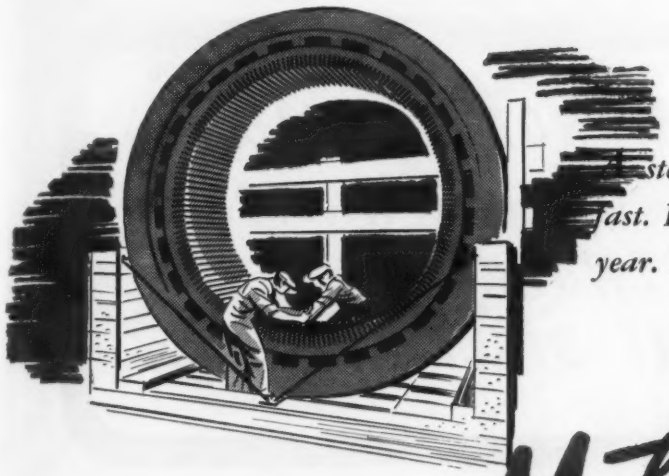
While the terminology and most of the references are British, no difficulty should be had in reading, although some circuits used in this country are neglected in the presentation and emphasis is given British circuits seldom used here.

The book should be very valuable for those who use the oscilliscope regularly—K. N.

RADIO LISTENERS' GUIDE, by Fred D. Rowe, 62 pages; A. E. Rowe, 660 Mission St., San Francisco, $1.

This is an excellent non-technical booklet for the average home listener. The author explains in simple terms the operation of the receiver, how it should be installed for best results, how to tune in short waves. Included are 15 chapters on radio interference and its remedies. This subject is very well covered. Chapters on frequency modulation and television are very short with little value. Questions most commonly asked radio salesmen are answered in the concluding chapter.

This would be an excellent pamphlet for the dealer to give the purchaser of fine radio equipment.



A steel company needed a special 2000 hp motor fast. Delivery of a new motor would take at least a year. Here's what Westinghouse M&R did about it.

25-Ton Motor Rewound

TO START STEEL PRODUCTION MONTHS SOONER

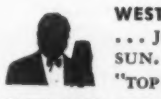
A used motor was located which could be adapted for this application. But it was wound for 2400 volts. Voltage required was 3800. This meant designing and furnishing an entirely new winding.

To complicate the rebuilding problem, the motor and bedplate weighed 50,000 pounds. But weight and size didn't bother the Westinghouse *Manufacturing and Repair** Plant assigned to handle the job.

Both the stator and rotor were completely rewound. Twelve-inch bearings were rebabbitted and rebored, and the entire motor rebuilt as good as new. Prompt delivery saved months in getting the customer's production under way.

Jobs like this are all in the day's work for Westinghouse M & R Plants—a nationwide chain of local repair shops ready to give you prompt service on reconditioning or rebuilding of any type of electrical equipment.

J-90520



WESTINGHOUSE PRESENTS
. . . JOHN CHARLES THOMAS
SUN. 2:30 EWT., NBC.
"TOP OF THE EVENING"
MON. WED. FRI. 10:15 EWT., BLUE NET.

When vital electrical equipment needs repair . . . phone the nearest office of Westinghouse Electric and Manufacturing Company for

Westinghouse

COMPLETE REPAIR SERVICE

*33 M & R PLANTS • • ONE NEAR YOU

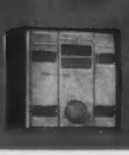
HERE'S HOW NORGE DEALERS BENEFIT FROM THIS NATIONAL NETWORK OF INDEPENDENT DISTRIBUTORS...

BETTER PRODUCTS FOR A BETTER WORLD

SEE

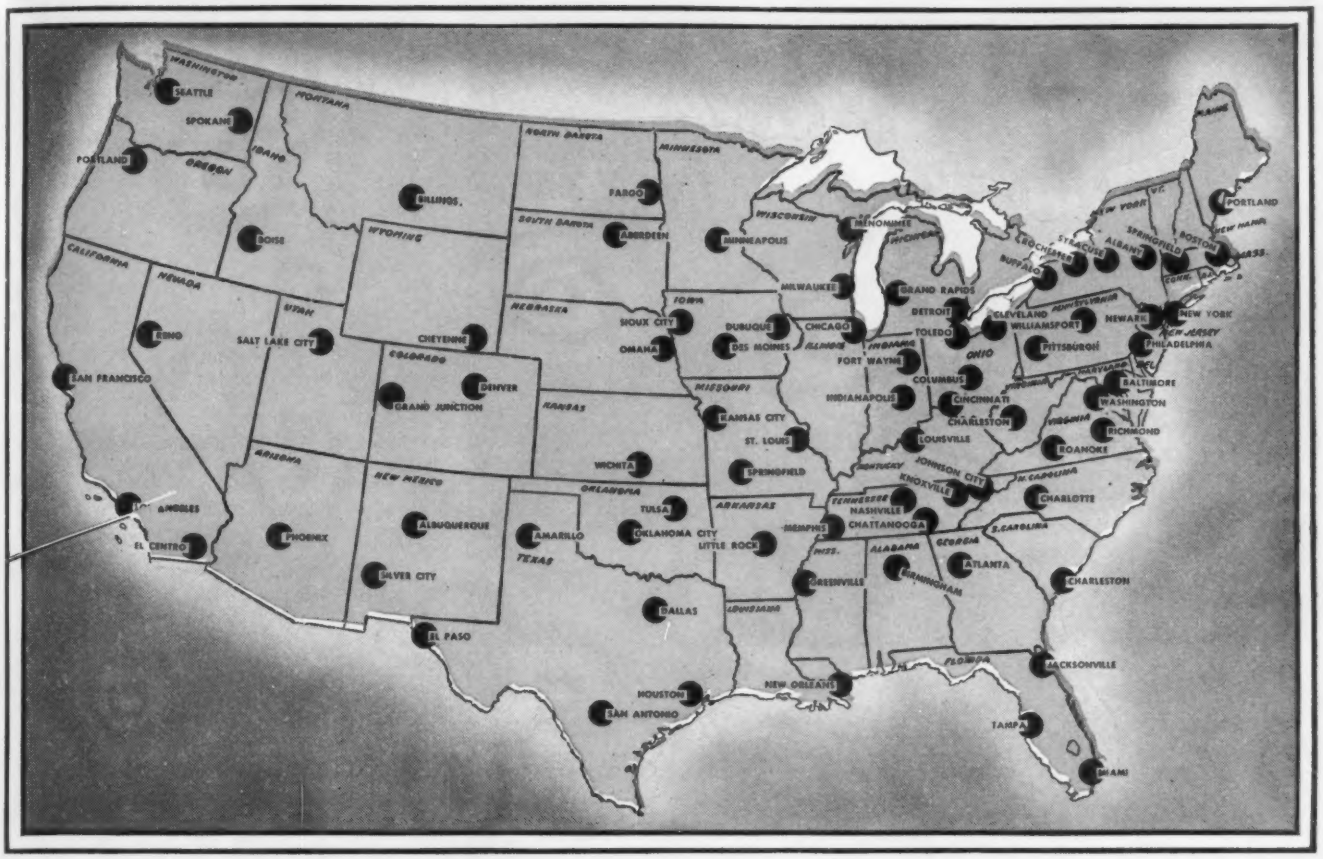
NORGE

BEFORE YOU BUY



ARMY NAVY

"...for outstanding production of war material."

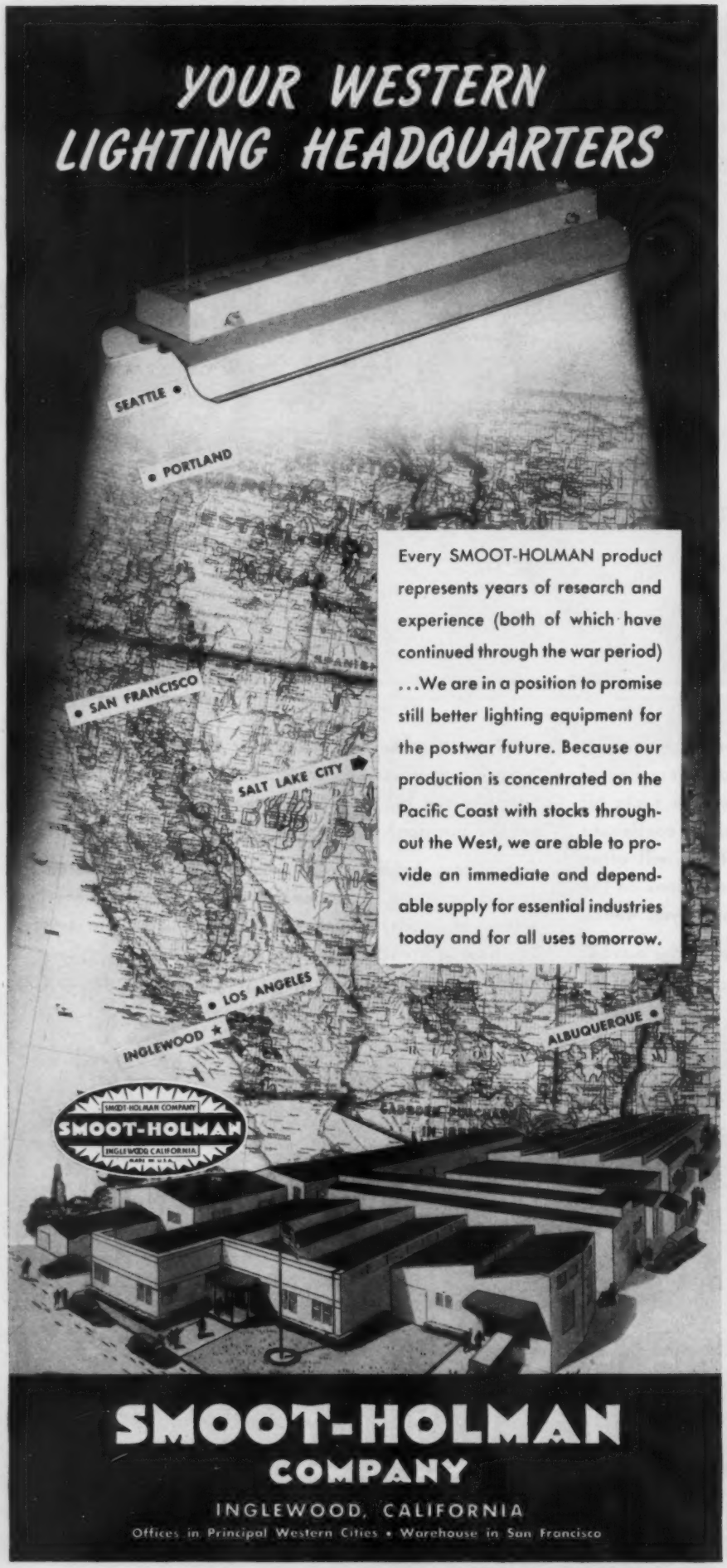


Your Norge distributor is an independent business man who knows every detail of every model of every line of Norge household appliances. And, like you, he backs his judgment with his own money. This assures his continuous personal interest in your problems, which he will often solve for you by his authority to make final decisions on the spot, cutting red tape and saving you days, even weeks.

Since 1941 there has been a 37% increase in the number of Norge distributors. No matter where you do business today, an aggressive, progressive Norge distributor (carefully selected for his ability to keep you in a sound competitive position) is your neighbor.

The sincere, helpful, profit-producing service rendered to dealers by sound, seasoned Norge distributors is another reason why today so many men in the know are saying, You have a great future with Norge.

NORGE DIVISION, BORG-WARNER CORPORATION, DETROIT 26, MICHIGAN


YOUR WESTERN
LIGHTING HEADQUARTERS
SEATTLE
PORTLAND
SAN FRANCISCO
SALT LAKE CITY
LOS ANGELES
INGLEWOOD
ALBUQUERQUE
Every SMOOT-HOLMAN product represents years of research and experience (both of which have continued through the war period) ...We are in a position to promise still better lighting equipment for the postwar future. Because our production is concentrated on the Pacific Coast with stocks throughout the West, we are able to provide an immediate and dependable supply for essential industries today and for all uses tomorrow.
SMOOT-HOLMAN
INGLEWOOD CALIFORNIA
SMOOT-HOLMAN
COMPANY
INGLEWOOD, CALIFORNIA
Offices in Principal Western Cities • Warehouse in San Francisco

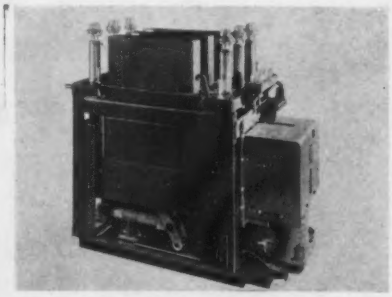
PRODUCTS

that are news

Air Circuit Breaker (800)

Allis-Chalmers Mfg. Co. has developed a "Ruptair" magnetic type air circuit breaker, available in high-voltage, oilless switchgear rated 5,000 volts and below and 150,000-kva interrupting capacity and below. According to the manufacturer, this breaker has over-all dimensions as compact as standard oil breaker switchgear and all parts are accessible.

The arc chute has been coordinated carefully with the contact and arc runner design to give consistent and reliable interruption through the entire range of current to be interrupted, the announcement states. The magnetic circuit, consisting of one husky blowout coil and two laminated iron pole pieces per phase, is arranged to force the arc up into the arc chute immediately upon separation of the arcing contacts.



Hose Clamp (801)

A mechanical device for connecting various kinds of fittings, special nipples, menders or ordinary pipe to hose has been developed by the Punch-Lok Co. This clamp is for all types of hose, the manufacturer states, and is available from ¾ to 48 in. ID. It is claimed that, once locked, neither vibration nor rough handling can loosen it.

In making the connection, a broad, flat high-tensile-strength galvanized steel bond is double wrapped around the joint. After tensioning with a pull of 1,000 lb. within the tool, the ends are locked together under tension without loss of tension within the steel clip. The excess band is cut off flush with the clip.

The number 3 clamp with a ⅜-in. band width is designed for applications ranging from ¾ in. OD to 3/16 in. ID hose. Clamps ranging in diameter from 1 to 38 in. ID. have a band width of ⅝ in. For electrical applications where corrosion resistance is essential these clamps may be obtained in Everdur, a copper base alloy. Clamps are available in preformed or open end type.

Motors (802)

Electric Machinery Mfg. Co. has announced a new line of heavy-duty induction motors in sizes ranging from 200 to 1,000 hp. and in squirrel cage and wound rotor models. Special electrical and mechanical modifications can be supplied to meet specific applications, the announcement states.

IT'S WHAT WE DO NOT DO . . .

THAT MAKES THE L-M ROUND-WOUND A BETTER TRANSFORMER . . . THE WOUND CORE IS LITERALLY "UNTOUCHED BY HUMAN HANDS!"

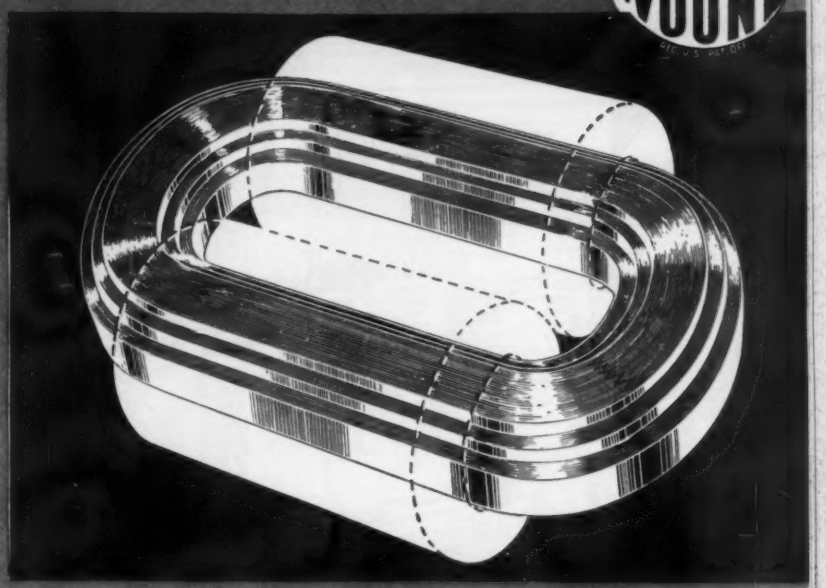
ROUND COILS WOUND CORE

Every engineer knows the basic fundamentals that govern good transformer performance. Therefore it is unnecessary for us to make elaborate claims. We prefer to let the design and construction of the L-M Round-Wound Transformer speak for themselves.

Distribution engineers are familiar with the fact that ultimate results are only attainable by adhering to correct basic principles. They know that air gaps in a core cause high exciting current; that a long coil is better than a short coil; that a round coil is better than a rectangular coil.

The first step in the design of a good transformer is a good core, one made of the correct material properly annealed with no disturbance of the material after annealing.

At the right we give you the highlights in the design and manufacture of an ideal core —the L-M Round-Wound Core. Its practical advantages need no elucidation. Every distribution engineer will recognize them at a glance. It's the things that we do NOT do that prove so important in L-M Round-Wound Transformer performance.



The core is NOT stacked. It is wound under tension and clamped under pressure. The result: practically no air gap with consequent lower exciting current. In some sizes this reduction is as much as 50%.

The core is NOT rectangular. It has no wasteful corner sections. Core strips of silicon steel are wound "with the grain" in an elliptical shape, closely approaching the perfect magnetic flux movement—100% "downstream."

The core is NOT relaminated, unwound for rewinding or cut into sections after annealing. As a result characteristics remain stable.

Core and coils are NOT assembled backwards. L-M round coils are wound directly onto the core. The core is not rewound or cut and fitted to the coils. Therefore there is no need for disturbing the core after annealing.

The cross section of the core is NOT square. Successive varying widths of strip steel are mechanically joined together and are wound so that the cross section is of a cruciform shape—a shape approximating a round cross section. The half slots so provided, act as channels between the core and the coils, permitting free, easy circulation of the cooling oil. Inherently low temperatures naturally result.

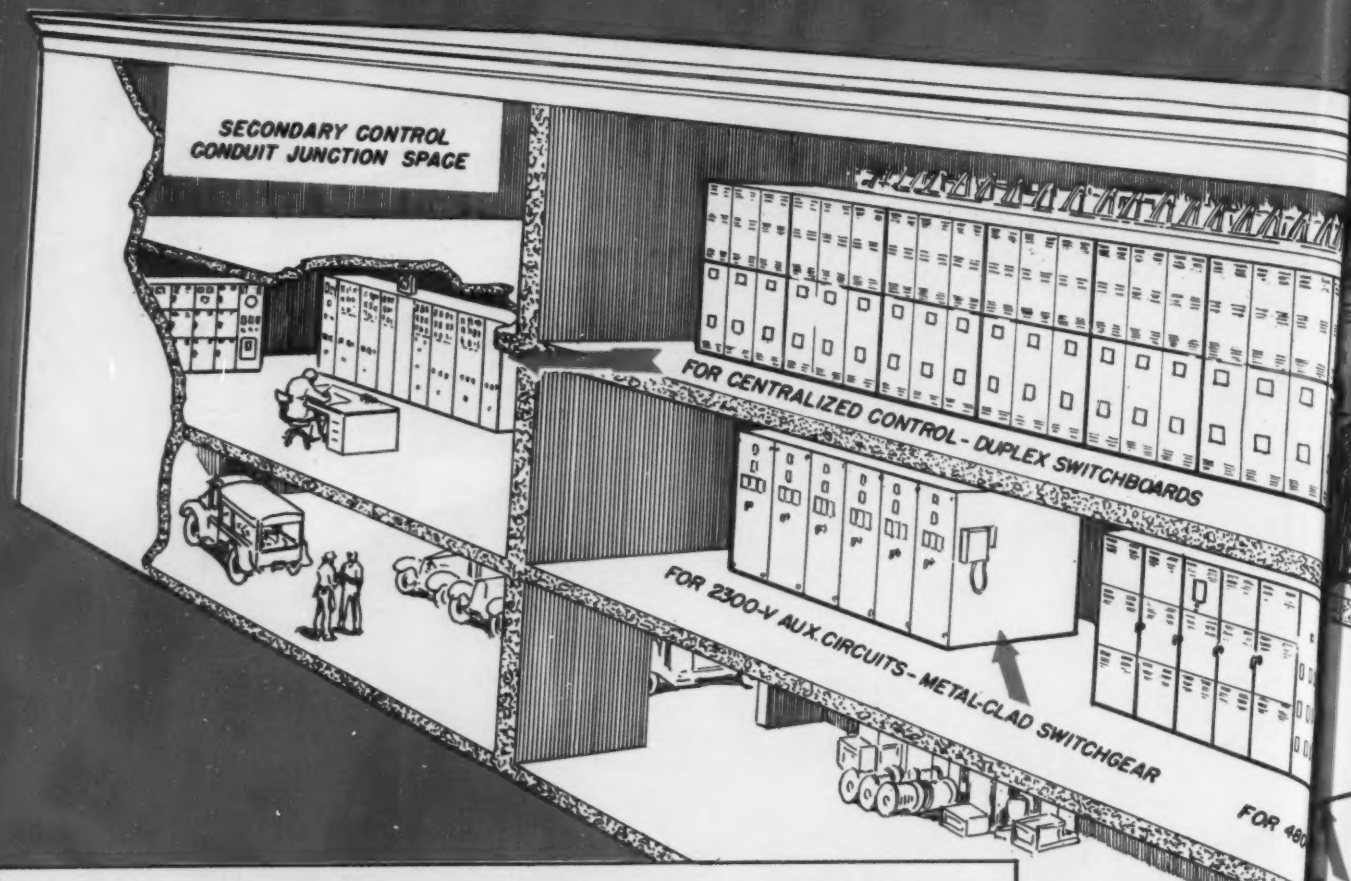
L-M Round-Wound Transformers are available in 1½ to 25 Kva, 2400 to 7620 volt ratings and are built in complete accord with EEI and NEMA distribution transformer standards. A very detailed description of these transformers will be found in Bulletin RW-421. You can secure a copy from your nearest Line Material sales office, or by writing direct to the Line Material Company, Milwaukee, Wisconsin.

LM

LINE MATERIAL
TRANSFORMERS

L-M DISTRIBUTION EQUIPMENT INCLUDES: Distribution Transformers · Fuse Cutouts and Fuse Links · Lightning Arresters · Oil Switches · Pole Line Hardware · Line Construction Specialties · Underground Equipment · Fibre Conduit · Street Lighting Equipment

LOOK FORWARD TO THIS


SECONDARY CONTROL
CONDUIT JUNCTION SPACE
FOR CENTRALIZED CONTROL - DUPLEX SWITCHBOARDS
FOR 2300-V AUX. CIRCUITS - METAL-CLAD SWITCHGEAR

HOW ONE COMPANY MADE REAL SAVINGS IN PLANNING, INSTALLATION, and OPERATION — using *standard* units

THE sketch shows a recent installation of complete primary and secondary switchgear equipments. The entire installation, including duplex control board, metal-enclosed reactors, and bus runs, was planned as *one co-ordinated job.*

When another generator was required, instead of adding to its concrete-cubicle switchgear, this utility took advantage of modern equipment. This layout of metal-enclosed switchgear saved space. Bus runs were kept as short as possible.

Expensive, tedious construction-detail planning was avoided by utilizing standard repetitively built units. The installed cost was thousands of dollars lower than it would have been for on-the-job assembly or custom-tailored structures. Then, too, the cost was accurately predictable.

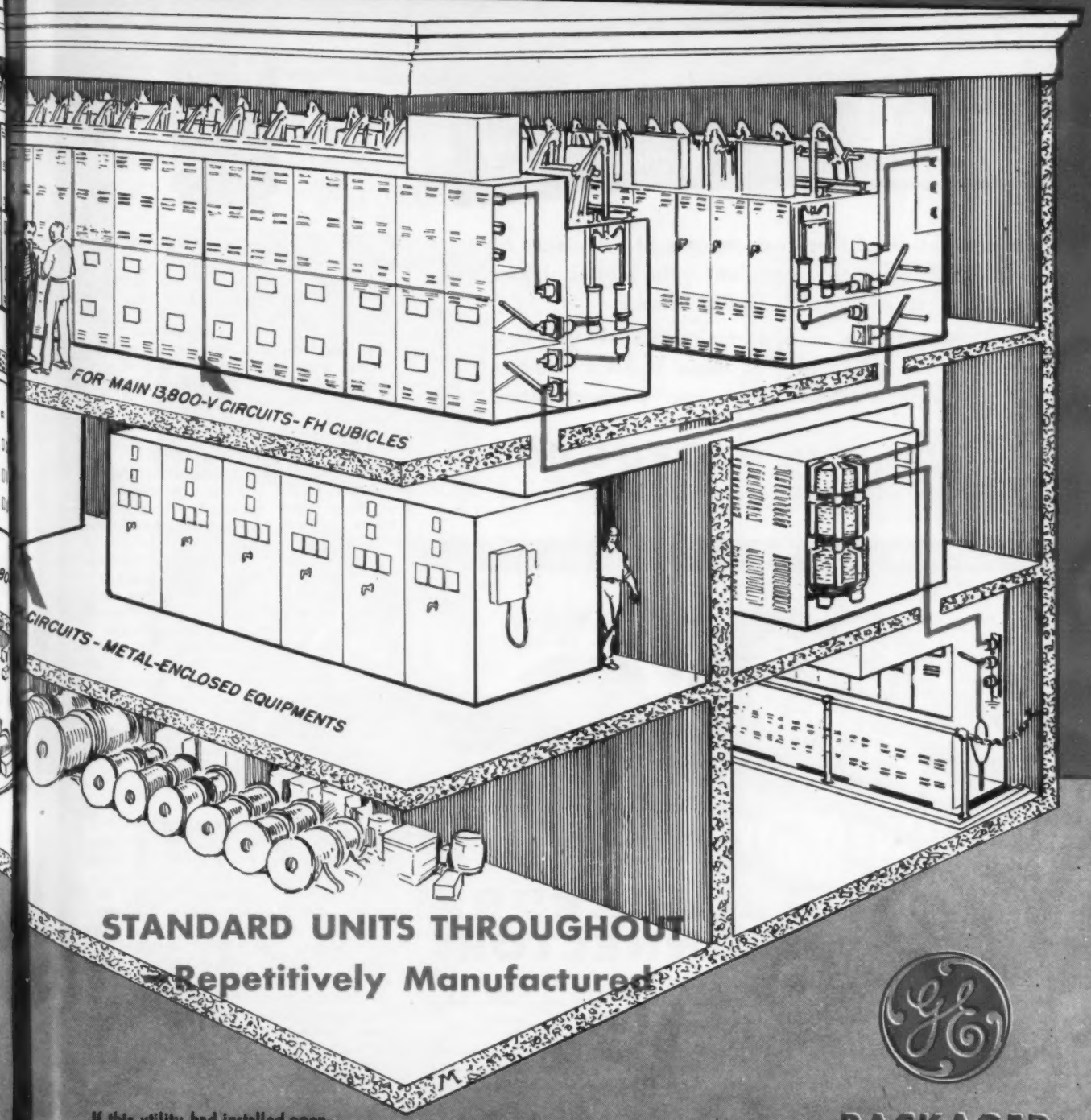
Note the short bus runs, and the central, air-conditioned control room which serves both the new and the old installations. Equipment like this represents the best modern practice of metal enclosure for safety to personnel and service.

The nearest G-E office will give you further information. *General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC

855-15-7300

TYPE OF SWITCHGEAR



STANDARD UNITS THROUGHOUT
Repetitively Manufactured

If this utility had installed open-type switchgear of equal rating, at least twice as much floor space would have been required.

GE

PACKAGED SWITCHGEAR

Buy all the BONDS you can—AND KEEP ALL YOU BUY

Pedigree
Electrical
INSULATING
VARNISH

Can Give You
GREATER PENETRATION • RESISTANCE
TO OILS, ACIDS, ALKALI • FLEXIBILITY
ABRASION RESISTANCE • FASTER
PRODUCTION

You can get all of these advantages at a minimum of overall cost when you complete your electrical jobs with Pedigree electrical insulating varnish.

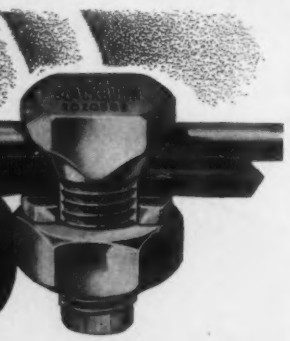
Why not give us an opportunity to show you how you can take advantage of these benefits — either in your present production or your postwar plans.

The PRODUCT WITH A PEDIGREE

The P. D. GEORGE CO.
5200 North Second Street • St. Louis, Missouri

Call In the Pedigree Varnish Man Nearest You.

STRONGER and BETTER
Check these 4 REASONS for the SUPERIORITY of
BLACKBURN CONNECTORS



Millions in use throughout the world

1. They're the only connectors made completely of high-strength silicon bronze — actually stronger than steel and more non-corrosive than pure copper.
2. Bridge-like pressure bar is one rigid and solid piece of metal. Reinforcing fillets under the nut give it maximum strength and rigidity, so that pressure will be distributed evenly over the entire length of the connection.
3. Very close tolerances are held on the sliding pressure bar and slot in bolt. This keeps legs of screw accurately spaced, assuring proper fit of the nut on the bolt and maximum strength of the thread.
4. All corners are thoroughly rounded to prevent nicking of the wires or cutting of the lineman's glove.

Over 75 Conveniently-located Jobbers' Stocks

JASPER BLACKBURN PRODUCTS CORP.
Main and Clinton Sts., St. Louis (6), Mo.
Builders of Quality Connectors for Over 10 Years

Lamp Starter (803)

A new model fluorescent lamp starter with automatic lockout-reset features has been announced by Lloyd Products Co. Current from the entire unit is cut off when a lamp becomes defective and flickers or blinks. The starter resets itself automatically

as soon as the defective lamp is replaced with a perfect one.

Another feature of the new starter is a plastic can, molded from a red, thermo-setting bakelite said to have high dielectric properties, providing exceptional strength with lighter weight. The can is sealed and has no projecting lugs; a knurled rim insures positive grip for inserting or removing the starter.

Plastic Junction Box (804)

A plastic electric junction box claimed to be much lighter and easier to assemble and maintain than standard aluminum alloy boxes has been announced by the Glenn L. Martin Co. for airplane use. According to the manufacturer, the new box reverses present practice by using a flat plate as the main section to which installations and wiring are attached and a molded cover of Plexiglas or other transparent plastic. The base plate is sensitized and the wire flow diagram is reproduced on it by a photograpic process, simplifying assembly and providing a permanent record for use of field service men. Although designed for the radio direction finder junction box, the unit is applicable to all other airplane junction boxes, the company states.

Water Reel (805)

Appleton Electric Co. has developed a heavy-duty water reel, built to accommodate 50 ft. of 1-in. ID x 1⅝-in. water hose, for use on special machinery. The reel is powered by motor springs similar to those used on the type EG reel. Two springs work in series and two units work in parallel, providing the spring power for hose take up. A specially designed swing joint has an internal ball bearing furnished with stainless steel balls to prevent corrosion. A 1-in. pipe inlet fastened directly to the supporting bracket may be mounted at any 90° position, it is announced.

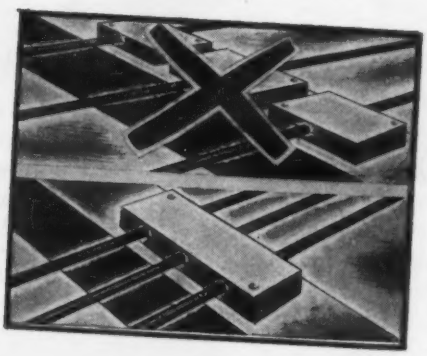
Impulse Timer (806)

Struthers-Dunn Inc. has developed an impulse initiated timer which it claims is 71.8% smaller by volume than previous units for similar applications. Other features are said to be shock-proof construction, accessible contacts and dust-proof cover.

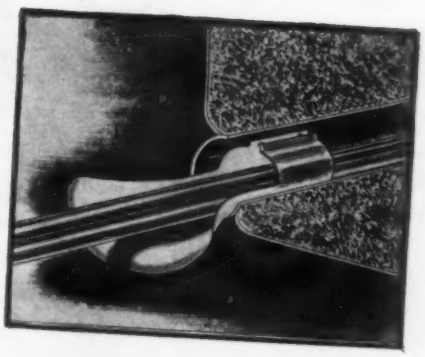
This timer is available in both a-c and d-c types. Contact operation occurs at the end of a delay interval after power has been applied or after receipt of a momentary impulse from a push button, limit switch or other source.

DAMAGE

A few easily-observed rules will help prevent damage to electric wires, cables and cords from abrasion, mechanical abuse, and other sources of trouble. Here are some helpful hints:

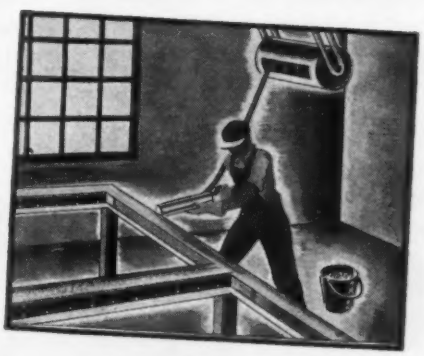


SPACE YOUR CABLES AS CLOSE TOGETHER AS POSSIBLE on overhead circuits if you need to reduce reactive voltage drop. Leave space for air circulation. Indoors, keep cables away from high voltage equipment and sparking motors. They generate ozone which is destructive to rubber.

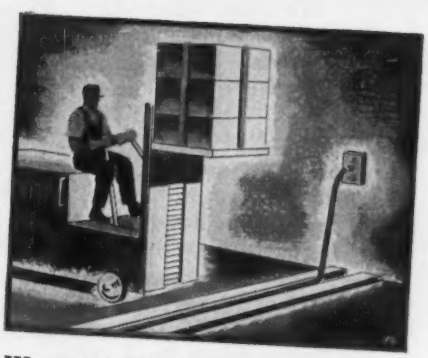


WHERE WEAR MAY OCCUR, such as in duct mouths, protect your cables with a semi-circular abrasion-resistant sleeve.

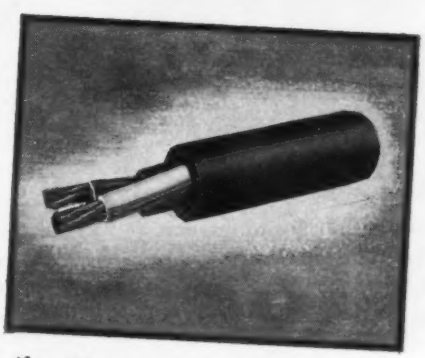
SPLICES WILL LAST LONGER when protected by a coating of weatherproof paint.



USE LARGER DIAMETER PULLEYS. Don't run cables and cords over small diameter pulleys or drums. Continued bending and flexing around a short radius breaks the conductors —with a short circuit possibly resulting.



PROTECT CABLES AND CORDS FROM BEING RUN OVER by heavy movable equipment. Don't drag cables around sharp corners or yank them to remove kinks.



SPECIFY THE RIGHT CABLE — Precautions help any cable but remember the added value of using good cables from the start. OKOCORD, for instance, is an unusually sturdy portable cable that takes lots of hard treatment.

We are interested in helping you extend as far as possible the life of your electric cables, cords and wires. Wall chart, OK-2026, in color, with the above and other worthwhile suggestions will be sent on request. The Okonite Company, Passaic, New Jersey.

OKONITE

No. 5 of a series
by SYLVANIA
for all users of
fluorescent lighting

Fluorescent operating hints

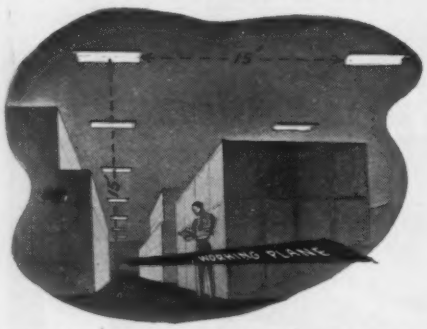
HOW TO GET THE RIGHT LIGHT FOR THE JOB

The lighting engineer plans illumination according to the work it lights. He can do much to help you get the right fluorescent light for top visual efficiency.

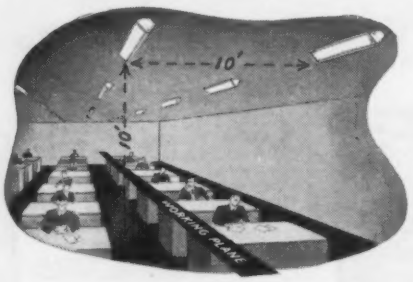
Size of lamps, spacing of fixtures, color of walls and ceiling, mounting height, size of area — all these factors determine intensity of illumination. The amount of light at the *working plane* is measured in *foot-candles* by means of a lightmeter.

TYPICAL INSTALLATION EXAMPLES

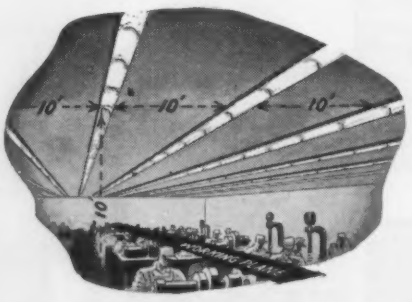
Based on Recommended Minimum Standards of Illumination by the I.E.S. (Illuminating Engineering Society)



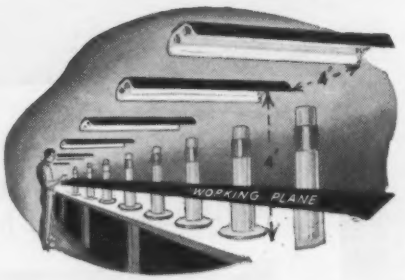
Ten foot-candles of illumination can be used for some types of rough assembly, molding clay products, tanning leather, grinding grain, general indoor construction, lobbies, corridors, elevators — lighting for traffic safety. Individual industrial fixtures spaced 15 feet apart, as shown at left, give this level in a typical stockroom.



Thirty foot-candles are needed for top efficiency in office work. This intensity of light also is recommended for sugar and flour grading, medium bench work in machine shops, photo-engraving blocking, hand casting in type foundries, warping dark woolens, and pressrooms. Individual shielded commercial fixtures are arranged here to give this illumination in a typical office.



Fifty foot-candles give adequate light for many types of fine assembly work, fine glass grinding and polishing, inspection, silk and cotton warping, stitching light materials, and automobile assembly. Continuous row of fluorescent fixtures at this height above a bench will do the job.



One hundred foot-candles of light are concentrated on this inspection bench for checking 1/10,000 of an inch tolerances. This high level of illumination also is required for such painstaking jobs as tint-laying in engraving, watch manufacturing, fine proof-reading, and show windows in secondary business districts. Close spacing of fixtures, as shown, pays in better work.

When you plan special fluorescent installations, avoid too much brightness contrast between localized bench lighting and the general lighting system. It makes for eye-fatigue and a drop-off in efficiency. For example, if 100 foot-candles are needed at a specific inspection bench, there should be about 25 foot-candles of general illumination in the rest of the room. This suggests a 4 to 1 rule of thumb.

MORE DETAILED INFORMATION—FREE

This folder contains a chart of I.E.S. Recommended Minimum Standards of Illumination for more than 200 different kinds of work — fluorescent priority information — cases of how the right fluorescent light for the job helps industry — tips on obtaining better lighting from your present fluorescent installations. Yours for the asking. Just write to Sylvania, Boston Street, Salen., Mass.

SYLVANIA ELECTRIC PRODUCTS INC.

"Fluorescent at its Finest"

555 So. Flower St. Los Angeles 13, Calif. | 111 Sutter St. San Francisco 4, Calif. | 4424 White-Henry-Stuart Bldg. Seattle 1, Wash.

FLUORESCENT LAMPS, FIXTURES AND ACCESSORIES, INCANDESCENT LAMPS, RADIO TUBES, CATHODE RAY TUBES, ELECTRONIC DEVICES

OPERATE YOUR SYSTEM MORE EFFICIENTLY *with carrier telemetering*

Interconnection of generating stations and power systems has expanded the need for, and use of, telemetering. With lines loaded to the limit, accurate information on power flow and system characteristics is more vital than ever before.

Carrier telemetering brings together at a common point significant quantities for efficient system operation. These quantities may be used independently for manual system control, or totalized to initiate automatic load control equipment. Automatic system control is particularly advantageous in regulating the net interchange of power between large interconnected systems.

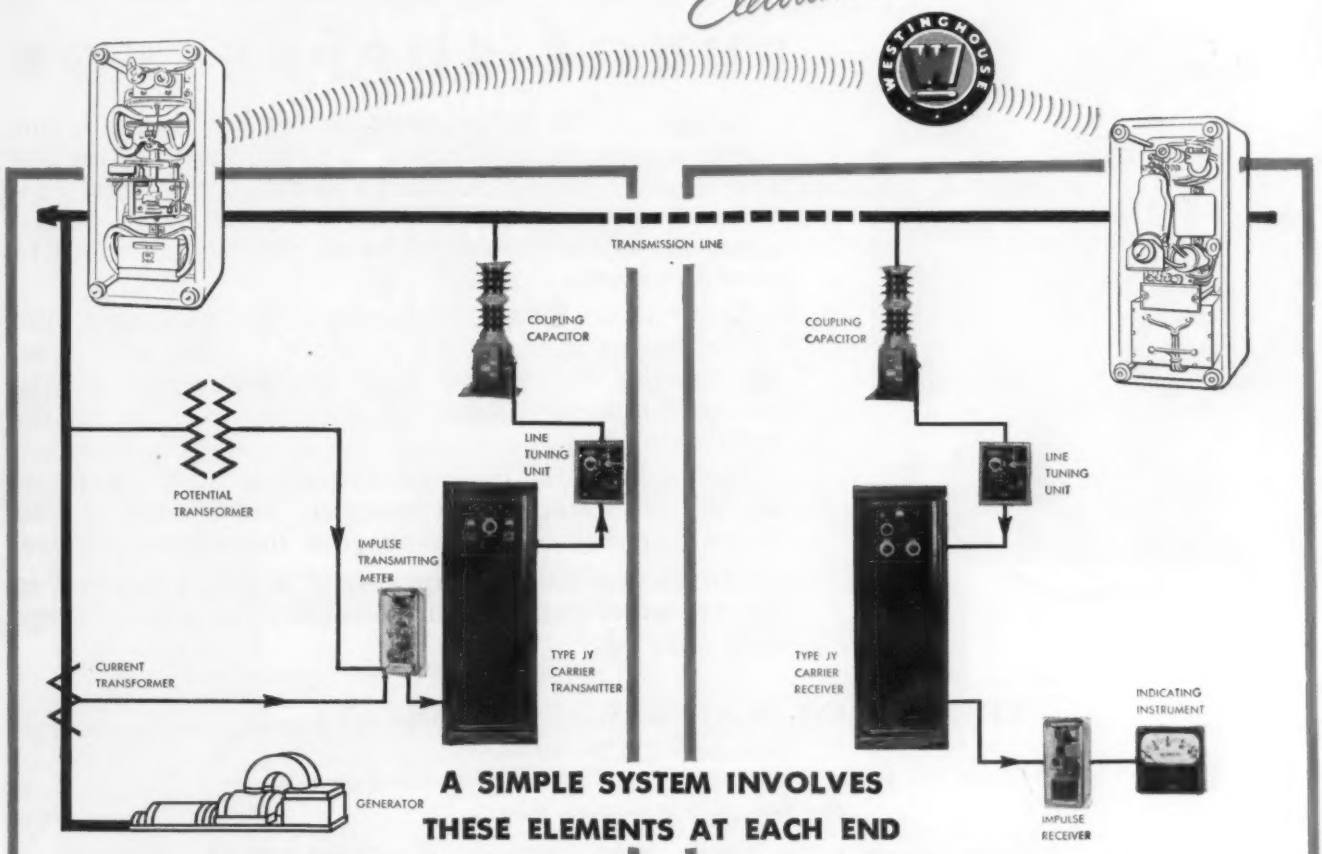
Westinghouse carrier telemetering equipment is basically simple, and can be adapted to a wide range of requirements. Your nearest Westinghouse office can offer valuable aid in planning an application to meet your needs. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

J-97087

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Electronics at Work



A SIMPLE SYSTEM INVOLVES THESE ELEMENTS AT EACH END

AT SENDING END

A MEASURING DEVICE—which responds to the desired quantity, and initiates impulses to actuate the carrier transmitter.

CARRIER TRANSMITTER—to generate the carrier current.

LINE TUNING UNIT—cancels the impedance of the coupling capacitor.

COUPLING CAPACITOR—through which the carrier flows.

AT RECEIVING END

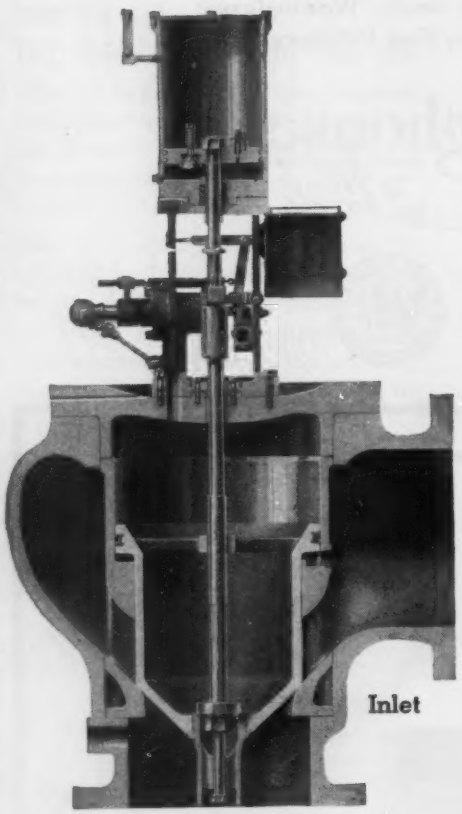
COUPLING CAPACITOR—through which the carrier flows to the receiver.

LINE TUNING UNIT—cancels the impedance of the coupling capacitor.

CARRIER RECEIVER—that receives and rectifies the carrier impulses, converting them to d-c impulses.

AN IMPULSE FILTER—which converts impulses received at a given rate into a dial reading or chart recording.

Greater Surge Impacts Follow Increased Flow!



Protect Your Water-Pumping Lines with The PELTON SURGE SUPPRESSOR

Sudden power failure to the motor driving the water pump causes back surges. When you increase the flow through pump discharge lines, surge danger increases. These sudden pressure rises may exceed many times the pumping head and be sufficient to burst the line.

The Pelton Surge Suppressor, located near the pump, opens automatically before the surge arrives, releases the water, protects your line and then slowly closes. It also opens automatically when other excess pressures develop.

Here's low-cost insurance against surge impacts which do break water-pumping lines — the Pelton Surge Suppressor. It saves your lines from rupture.

The Pelton Surge Suppressor is manufactured to protect water-pumping lines regardless of how large they may be.

THE PELTON WATER WHEEL COMPANY

HYDRAULIC ENGINEERS

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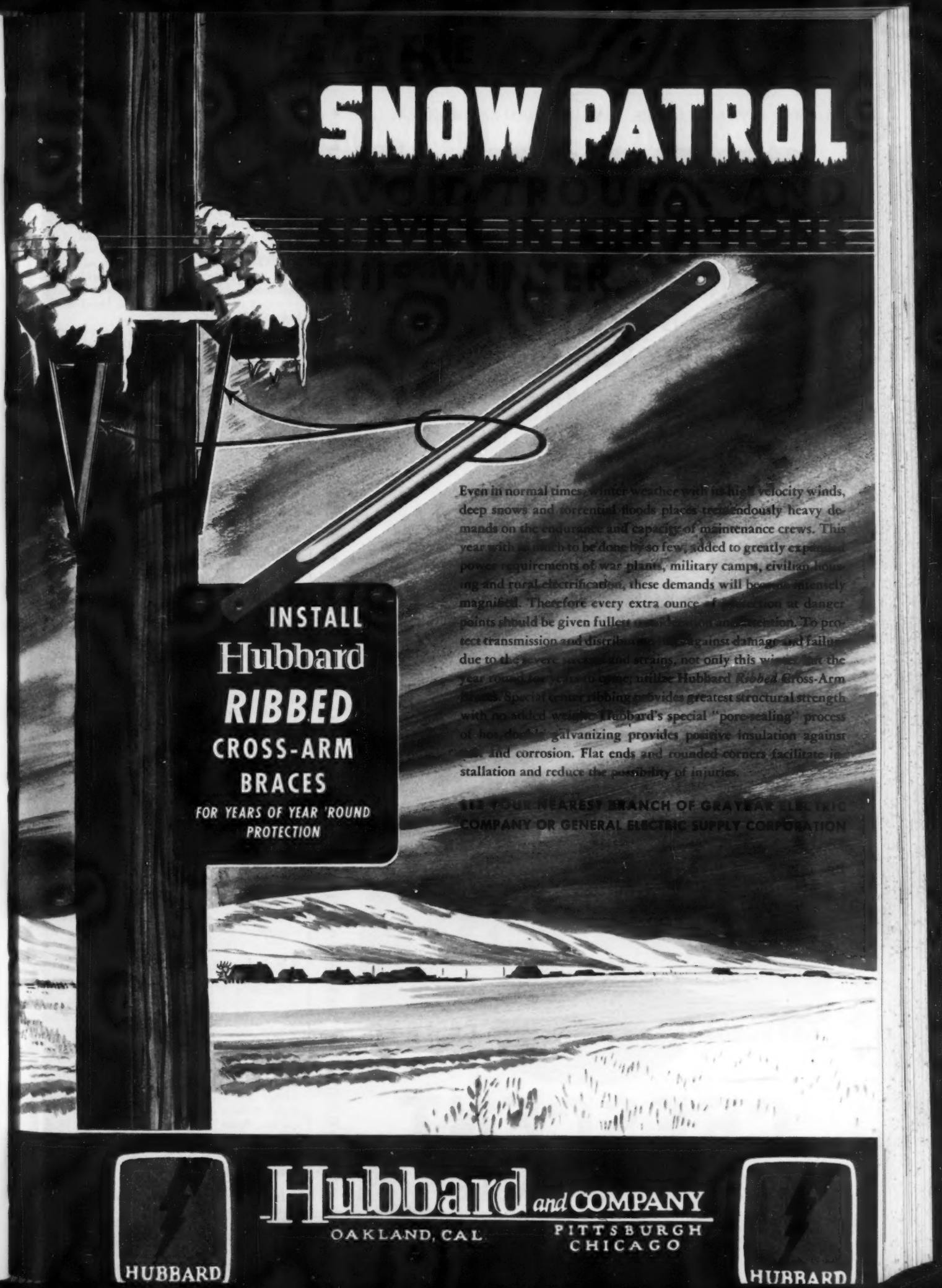
Subsidiary of THE BALDWIN LOCOMOTIVE WORKS


SNOW PATROL
Even in normal times, winter weather with its high velocity winds, deep snows and torrential floods places tremendously heavy demands on the endurance and capacity of maintenance crews. This year with so much to be done by so few, added to greatly expanded power requirements of war plants, military camps, civilian housing and rural electrification, these demands will be tremendously magnified. Therefore every extra ounce of protection at danger points should be given fullest consideration. To protect transmission and distribution lines against damage and failure due to the severe weather and strains, not only this winter but the year round, use the Hubbard Ribbed Cross-Arm Braces. Special center ribbing provides greatest structural strength with no added weight. Hubbard's special "pore-sealing" process of hot dip galvanizing provides positive insulation against rust and corrosion. Flat ends and rounded corners facilitate installation and reduce the possibility of injuries.
SEE YOUR NEAREST BRANCH OF GRAYBAR ELECTRIC COMPANY OR GENERAL ELECTRIC SUPPLY CORPORATION
INSTALL
Hubbard
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BRACES
FOR YEARS OF YEAR 'ROUND PROTECTION
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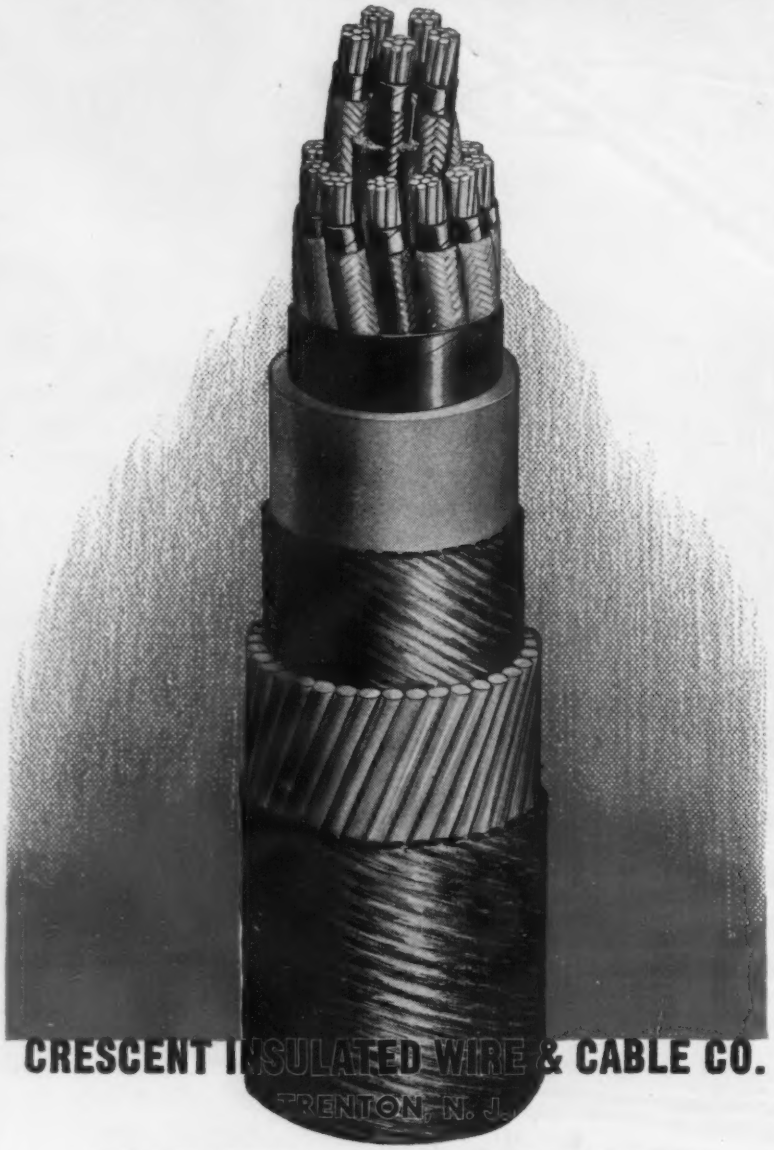
CRESCENT

Ability to Manufacture
WIRES AND CABLES
is the Result of
OVER FIFTY YEARS EXPERIENCE



CRESCENT INSULATED WIRE & CABLE CO.
TRENTON, N. J.

CRESCENT
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PACIFIC TERRITORY SALES REPRESENTATIVES
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• IMPERIAL NEOPRENE JACKETED PORTABLE CABLES •

• ARMORED CABLE • CRESFLEX NON-METALLIC SHEATHED CABLE • SERVICE ENTRANCE CABLE • BUILDING WIRE •

• PERMACORD • LEAD-ENCASED AND PARKWAY CABLES • SYNTHOL WIRES • WELDING CABLES • SHIPBOARD CABLES •

Plating Rectifier (807)

A 6-volt, 2,000-amp. plating rectifier has been added to the General Electric line, providing 12 kw. output capacity in one unit. Use of an automatic voltage regulator permits automatic control of the anodizing power supply, it is stated.

Output ratings possible with this unit are: 6 volts, 2,000 amp. or 12 volts, 1,000 amp.; 24 volts, 500 amp. or 48 volts, 250 amp. Two separate secondary circuits each feed a separate bank of copper oxide rectifier stacks which may be connected either in series or parallel on the d-c buses in the rear of the unit.

The rectifier is available in two a-c supply ratings, 230 and 440 volts, three phase, 60 cycles. Two or more rectifiers may be connected in series, parallel to provide practically any output voltage and current required, the manufacturer points out. The unit is designed for floor mounting with air intake at the bottom and exhaust at the top.

Tubing (808)

National Varnished Products Corp. has developed an extruded vinyl tubing, which it claims has the same electrical properties as conventional tubings, with much better heat endurance characteristics, resistance to oil embrittlement and gasoline-benzol. According to the manufacturer, wires insulated with the new tubing may be soldered without special care or technique and without flow or opening of the tubing near the point of soldering. It is said to be tough, resistant to tear and to have a tensile strength in excess of 3,000 psi., with elongation from 170 to 410%, depending on type, and to remain flexible down to minus 80° F. Designated as Natvar 400, the tubing is available on the same priority basis as standard vinyl tubings.

Aircraft Line (809)

Poulsen & Nardon, Inc., has announced that it has grouped into a standard line more than 200 aircraft junction box assemblies, ranging in size from 1⅞ x 1⅞ in. up to 23 x 15 in. Material thicknesses are from .032 to .064 in. in 2 SO or 3 SO aluminum. Covers to fit are in 3S½H aluminum. According to the announcement, boxes and covers can be supplied with conventional nut plate and screw type fasteners, or other types of fasteners on request.

Air Inductor Coils (810)

Barker & Williamson have added to their line miniature air inductor coils in diameters from ½ to 1¼ in. Any type of mounting can be supplied, according to the manufacturer, and the coils can be equipped with fixed or variable, internal or external coupling links and other features to match practically any specification. Five standard diameters are available in any winding pitch from 44 to 4 turns per inch, or less if required. Wire sizes range from No. 14 to No. 28.

Fluorescent Ballast (811)

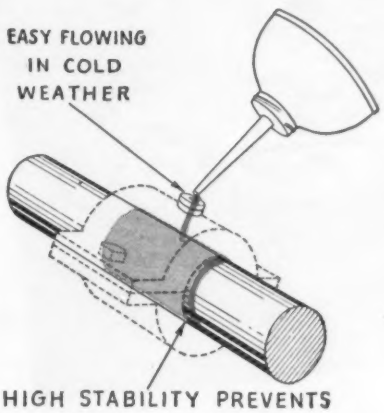
Jefferson Electric Co. is offering a fluorescent ballast which permits leads to be extended from the ends or bottom as required. Insulated bushings set at an angle protect the leads in either installation. Available in two-lamp, 40-watt size.

STANDARD ENGINEERS NOTEBOOK

VOL. 1-W NO. 6

Stable, uniform oil for general external lubrication

Because it is pure solvent-refined mineral oil, carefully manufactured, Calol Red Engine Oil may be used for almost all ordinary lubrication in an industrial plant.



It has a low carbon residue and pour test rating that gives it a wide application range. It is exceptionally stable in use and does not form objectionable deposits in or around bearings.

Calol Red Engine Oil is recommended for engine bearings, machinery and shafting that are lubricated by squirt cans, ring-, chain-, bottle-, drop-feed- or wick-oilers. It is also used in some circulating systems.

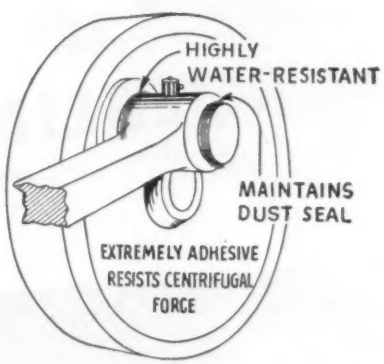
It is sold in five grades: 11, 15, 18, 20 and 25. The lighter grades may be filtered for re-use.

Grease lubrication under severe operating conditions

When heavy bearings are subjected to shock loads, must operate in dust or water conditions or when a lubricant that will not readily throw off is needed, Calol Multi-Service Grease is recommended.

This black colored grease contains a heavy oil blended into its special soap base. The oil spreads over bearings a tough film that is difficult to rupture or displace. The special soap base provides a seal against water and dirt.

There are seven grades of Calol Multi-Service Grease. Numbers 0 and 1 are used for enclosed light gears and gun-lubricated heavy machinery. Two and Three are widely used on mill machinery. Four, Five and Six are exceptionally stiff and are particularly adapted for use on plain, low-speed journal bearings with large clearances.



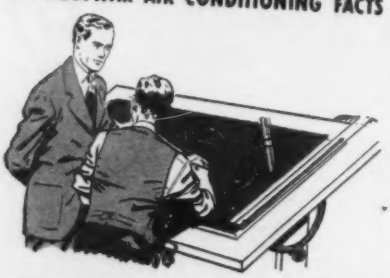
Standard Fuel and Lubricant Engineers are always at your service. They'll gladly give you expert help—make your maintenance job easier. Call your Standard Representative or write Standard of California, 225 Bush St., San Francisco 20, California.

STANDARD OF CALIFORNIA

Why CR-1 *Missed the Fight...*

CR-1 was a fighter plane part . . . made on the swing shift and gauged perfect within .0001ths of an inch. Its component part CR-2 was finished and gauged in the heat of next day. But by that time, CR-1 had expanded beyond tolerance—preventing an accurate fit. So CR-1 *became* scrap . . . instead of *getting* in the scrap! THE MORAL: Controlled temperature can improve all manner of processes and materials . . . metals, foods, chemicals, fibres . . . help to hold dimensions, characteristics and quality within close limits. So, if your operations are weather-sensitive—(and most are!) . . . you'll want to check up on air conditioning—for production—tomorrow!

YOUR UTILITY IS THE LOCAL SOURCE OF POSTWAR AIR CONDITIONING FACTS



On The Payroll of your local utility is a skilled engineer who can help you determine *where* and *how* to air condition from the twin viewpoints of top product quality and low production cost.

Sure, his company has something to sell. But his "know-how" and cooperation are yours for the asking . . . can help you save time and take advantage of the experience of others.

And when it comes to modernization, look to Roebling for all the specialized wires and cables you'll need . . . for better air conditioning, lighting, power distribution and other electrical and electronic cost-cutters the war has produced.

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Wire Rope and Strand • Fittings • Cold Rolled Strip • Aircord, Swaged Terminals and Assemblies • Round and Shaped Wire • Wire Cloth and Netting • High and Low Carbon Acid and Basic Open Hearth Steels • Suspension Bridges and Cables • Electrical Wires and Cables • Aerial Wire Rope Systems

40,000 INDUSTRIAL EXECUTIVES ARE REFERRED TO THEIR LOCAL POWER ENGINEERS for help in planning better postwar use of electricity, by this current advertising of Roebling Electric Wires and Cables in "Mill & Factory" and "Purchasing". We hope that this advertising will result in desirable postwar loads for your company.

Full size reprints of the advertisement available on request

THE HOME OF THESE*

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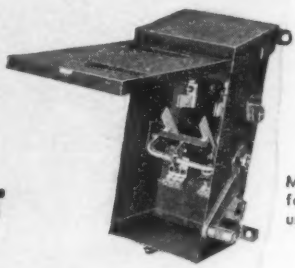
NOARK ELECTRIC PRODUCTS

*Newark, New Jersey Plant

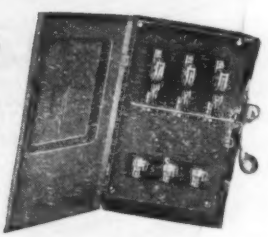
MAKING HISTORY *Today*

ON THE FIGHTING FRONT



Maritime Switch for Shipboard use

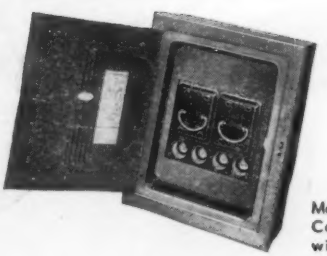
ON THE INDUSTRIAL FRONT



600 Volt Rotare Type Knife Blade Switch

Tomorrow

ON THE HOME FRONT



Main and Range Combination with 4 lighting circuits

FEDERAL ELECTRIC PRODUCTS COMPANY

PLANTS AT: 1429 PARK STREET, HARTFORD, CONNECTICUT AND 50 PARIS STREET, NEWARK, NEW JERSEY

NEW

G-E WEATHERPROOF SOCKETS

THIS sturdy socket with 6-in. leads is ideal for use in industrial plants, steel mills, shipyards, railroad construction, mines, etc. It is made of a tough compound . . . will withstand severe blows . . . has a weatherproof seal around lead-in wires and screw shell.

The weatherproof seal is made by pouring heat-resisting wax in a liquid state in the top of the socket. This wax (see cutaway diagram) covers the whole top of the screw shell and lead-in wire assembly; and it also fills the space between the screw shell and the socket body. This prevents water from seeping into the socket from the top.

The lasting qualities of the socket enable it to be used a second time, too. The length of the leads makes re-use easy.

FOR FURTHER INFORMATION about G-E weatherproof sockets, other wiring devices or conduits or wires and cables, see the nearest G-E Merchandise Distributor or write to Section CDW-843–18, Appliance and Merchandise Department, General Electric Co., Bridgeport, Conn.

Hear the General Electric radio programs: "The G-E All Girl Orchestra" Sunday 10 P.M. EWT, NBC. "The World Today" news every weekday 6:45 P.M. EWT, CBS.

BUY WAR BONDS AND KEEP THEM

ON ADEQUATE WIRING

S. J. O'Brien, electrical contractor, member of the National Adequate Wiring Bureau's executive committee says, "Full adequacy of wiring is the building industry's provable answer to the challenge of the coming wave of new home buyers."

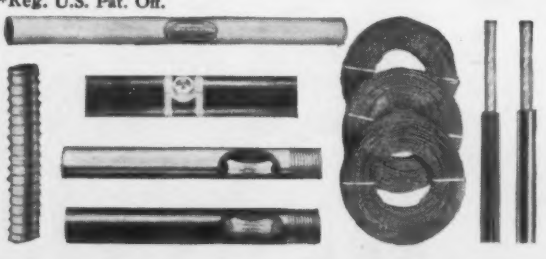
ADEQUATE WIRING — SERVES AND SAVES — THE KEY TO THE HOME OF TOMORROW

GENERAL ELECTRIC

G-E CONDUITS AND BUILDING WIRES

There are G-E conduits and building wires for every purpose: G-E White and G-E Black rigid conduits, EMT, flexible metal conduit, Fiberduct and various building wires including Type SN and Type SNW thermoplastic insulated, small diameter Flamenol* Building Wire.

*Reg. U.S. Pat. Off.



Motor Starter (812)

Allis-Chalmers Mfg. Co. is offering a magnetic, reduced voltage cage motor starter, which it states protects motors from sustained overloads, locked rotor condition, single phasing and overloading from too frequent starting. Designated as type ARC, the new starter is built for general industrial applications and is available for control of motors from 5 to 2,500 hp., up to 5,000 volts, three-phase, 50 or 60 cycles.

A built-in autotransformer secures reduced voltage, two-point starting for units rated through 800 hp. Above 800 hp., autotransformers are furnished for separate mounting. Interrupting capacity rating of the new starter is ten times the motor's full load current.

Voltage Tester (813)

A voltage breakdown tester recently put on the market by Industrial Instruments Inc. has an operating range of 0 to 10,000 volts d-c or 0 to 8,000 volts a-c. A lower-range instrument, with sloping panel, has a range of 0 to 4,000 volts d-c or 0 to 3,000 volts a-c. The voltage is continuously variable over the entire range, it is stated. The tester operates directly from 110-130 volt 50/60 cycle a-c line. A panel light indicates when instrument is "on." A red signal light indicates breakdown and the built-in meter indicates the direct reading voltage. Current is limited to approximately 50 milliamperes by current limiting resistors.

Cable Terminator Unit (814)

Delta-Star Electric Co. is offering an indoor cable terminator unit for use in making cable connections to high-voltage, large capacity three-phase motors. The sealed top terminator has a stuffing box entrance for three single conductor cables. The motor can be disconnected by loosening three stud connectors. Disconnecting type aerial lugs absorb vibrations from motor leads to the terminator bushings and allow for alignment variations, the announcement states.

Package Units (815)

Weltronic Co. has new combination time contractor "package" units, which it states were designed to provide simple, low-cost, automatic electronic control for resistance welders. Among features claimed for the units are operation from all standard a-c services; simplified circuits and fewer tubes; ability to convert manually or mechanically operated welders into electronically controlled units.

Luminaire (816)

Curtis Lighting, Inc., has announced that, with relaxation of restrictions on use of metal in fluorescent units, it has resumed manufacture of its Twin Skylux luminaire. For general office lighting, this unit can be mounted individually or in continuous rows, with or without a stem hanger. It is for use with two 40-watt lamps.

Elastic Lacing Cord (817)

A lacing cord made of an elastic material is being offered by the Art Chrome Co. of America for use with electric wire or cable. The manufacturer claims that the material will retain its elasticity indefinitely, that it will not be affected by tropical insects or by extremes of heat or cold.

"He gets all his pin-ups from the Leo J. Meyberg Co."

When it comes to pin-ups, Robert the Robot may be slightly out of this world—but not *our* world!

The objects of his affection are every day business with us. In fact, we doubt if there's anything Robert might dream up that we couldn't bring to life.

You should learn, as he has, that the Leo J. Meyberg Co. has the widest range of available electric and electronic merchandise on the Pacific Coast. Stocks you may have trouble locating elsewhere may be right in our hands. And we make every effort to put them in *your* hands with speed and dispatch.

We also handle Near Infra-Red heating equipment; Industrial Public Address, Music and Intercommunications systems; Industrial Lighting equipment. Engineering service on all these lines cheerfully furnished—gratis.

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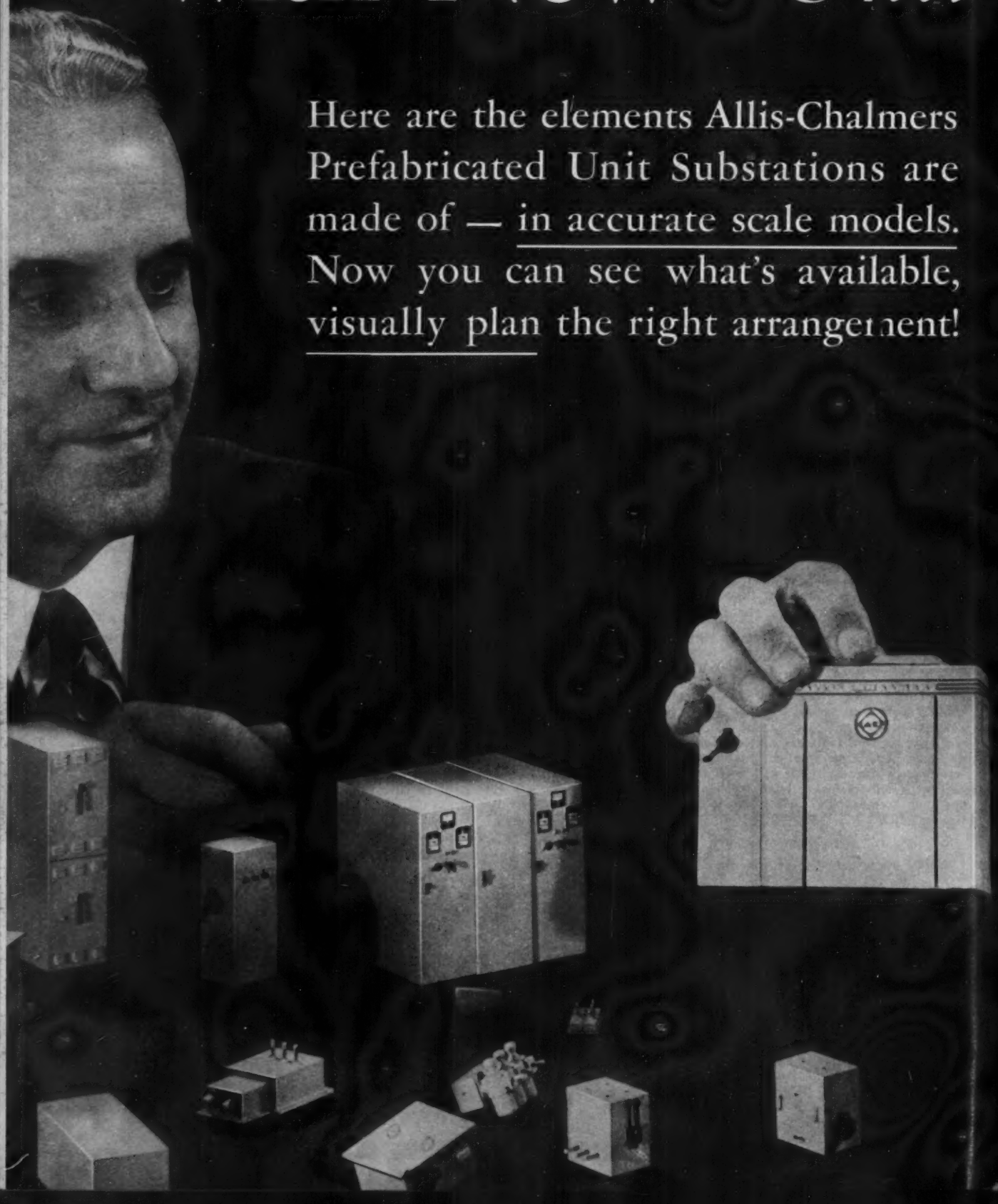
MOST COMPREHENSIVE INDUSTRIAL ELECTRIC AND ELECTRONIC STOCKS IN THE WEST

See Your Unit Sub with New "*Unit*

Here are the elements Allis-Chalmers Prefabricated Unit Substations are made of — in accurate scale models. Now you can see what's available, visually plan the right arrangement!



b Ideas Worked out

it Sub Builder" Set!

SEE WHAT'S AVAILABLE, experiment with various arrangements, make comparisons, build solutions. That's the simple, idea-stimulating procedure you follow when you use accurate new scale models of Allis-Chalmers Prefabricated Unit Substation elements to help work out your power distribution problems.

Visual planning of unit sub requirements is quick, accurate. At a glance you see what space the *right* arrangement will occupy . . . how it will look installed in your own plant. An even clearer picture will result if models are built up on a floor plan of your plant drawn to the same scale . . . ½ in. to 1 ft.

"Unit Sub Builder" Set will be shown by a field engineer from your nearby A-C office upon request. No obligation, of course. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

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A 1738

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At WESTON, production finally has outstripped the overwhelming war demand for panel and other instruments . . . making WESTONS again obtainable on a basis to meet most war production schedules.

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- *Panel & Switchboard Instruments (DC, AC, and Thermo)*
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- *Instrument Transformers*
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Weston Electrical Instrument Corporation
618 Frelinghuysen Avenue, Newark 5, New Jersey

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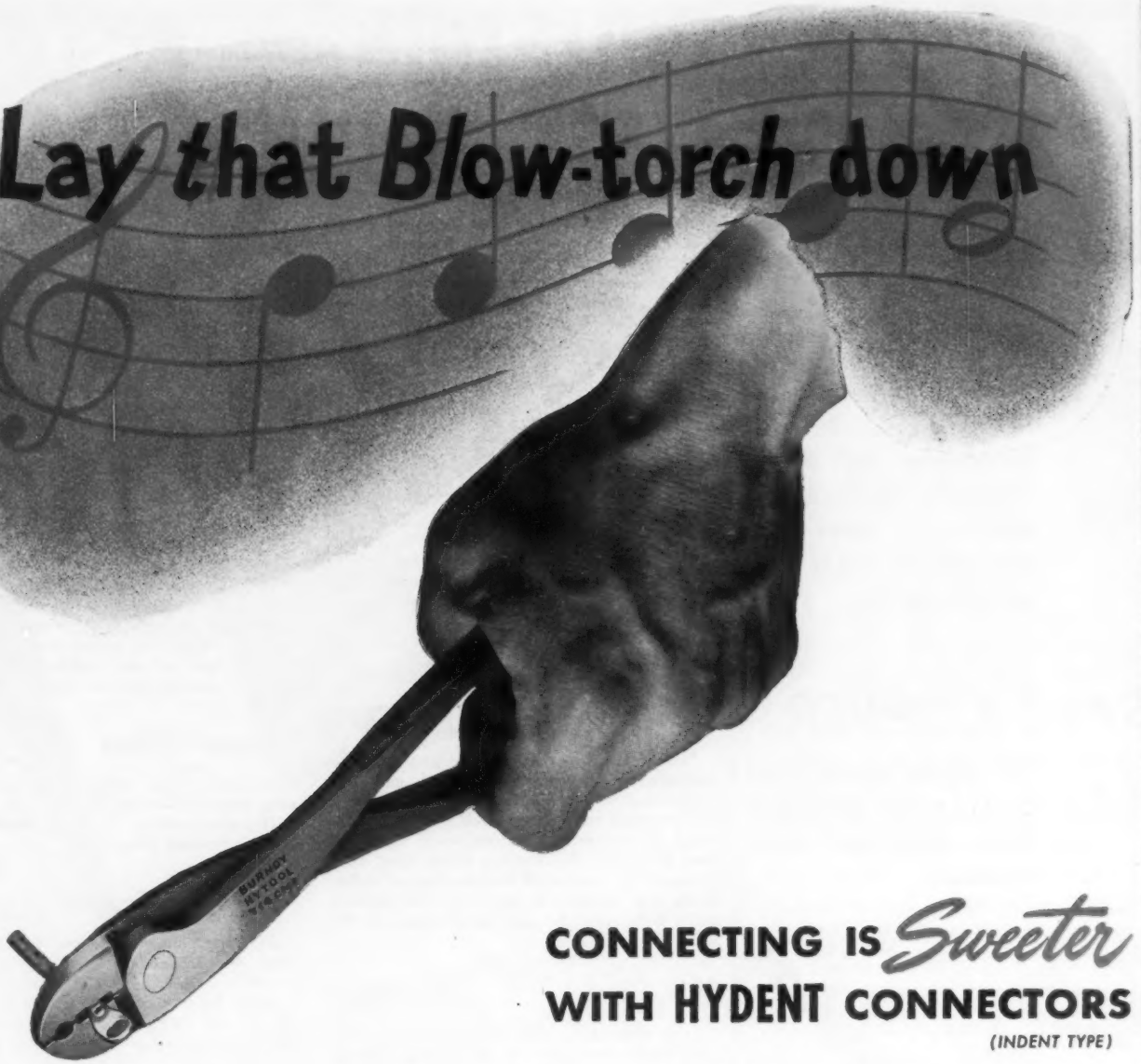

Patent No. 2,109,837. Listed by Underwriters' Laboratories, Inc.

CONNECTING IS *Sweeter* WITH HYDENT CONNECTORS

(INDENT TYPE)

Sure . . . you'll save plenty of time, and "do-re-me", using HYDENT (indent type) connectors on small wires.

But the important point is . . . your connections will be far better; *stronger mechanically* and *more efficient electrically*.

Because indenting with the simple HYTOOL *securely* joins connector and conductor . . . providing a connection that will resist loosening indefinitely. And beause HYDENT conectors are of *one-piece, pure copper* construction, maximum conductivity is assured.

You'll find the HYTOOL equally efficient for either production or maintenance needs. Why not send for full details today.

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SAVE COPPER

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BULLETINS

data books, etc.

Indoor Fuse Mountings (818)

Schweitzer & Conrad has released a new bulletin on its indoor fuse mountings and fused disconnects for the S & C liquid fuse. The booklet is a companion to a previous bulletin, covering similar apparatus for outdoor service. Dimensional data for the various assemblies are included, along with details on fuse clips and switch sticks and tongs for handling the fuses.

Appliance Catalogue (819)

To provide distributors and dealers with a brief description of representative prewar models in the Universal line, Landers, Frary & Clark has released a condensed catalogue. The 28-page booklet is one of the first of several planned by the manufacturer. Featured are Universal ranges, water heaters, home laundry equipment, home cleaning equipment and various small appliances for the home.

Temperature Control (820)

Fenwal Inc. has issued a 44-page bulletin covering its temperature control unit, the Thermoswitch. According to the manufacturer the thermoswitch may be used throughout the range of temperature control work, from sub-zero to 1,200° F. Various types have been designed for control of temperatures of solids, gases and liquids. A section of the bulletin deals with selection and application of the unit.

Data Sheet (821)

Trico Fuse Mfg. Co. has released a new data sheet describing its modernized line of wick feed oilers, with clear reinforced plastic bottles.

Germicidal Lamp (822)

"Guarding Health with the General Electric Uviarc Germicidal Lamp" is the title of a pamphlet listing uses of the company's ultraviolet lamps. A technical description and details of installation and maintenance are included.

Postwar Kitchen (823)

Edison General Electric Appliance Co. is distributing reprints of a statement by H. J. Scaife, manager of the Hotpoint kitchen sales division, published originally in "American Builder." This reprint deals with building and financing a complete kitchen, postwar.

Connector Chart (824)

Cannon Electric Development Co. has prepared a wall chart of type K and RK connectors. It is 38x50 in. and was designed for use in aviation schools, aircraft plants, air depots, flying fields, etc. for instruction, identification, assembly, ordering, servicing or repair of the K type connectors and accessories.

Big and Little Inch (825)

Delta-Star Electric Co. has published details of the electrical features of the Big and Little Inch oil pipe lines. Views of the high-voltage substations taking power from transmission lines of the public utilities and a one-line diagram are included.

Postwar Lighting (826)

As one of its series of postwar lighting prospectives, General Electric Co. has issued a 12-page bulletin, "Lighting Goes Dramatic for the Postwar Drugstore."

Fluorescent Fixtures (827)

Day-Brite industrial fixtures for two and three 40-watt and two 100-watt fluorescent lamps are described in bulletins being distributed by the company. One bulletin lists the W and WS series and a second is devoted to the heavy-duty Day-Line equipment.

Panelboard Modernization (828)

A method of modernizing obsolete and inadequate electric light and power panelboards without disturbing the box or conduit is described in a pamphlet prepared by Square D Co.

ELECTRICAL WEST, 68 Post St., San Francisco, 4, California

Please send me information about following CIRCLED items:

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Name..... Company*..... Title*.....

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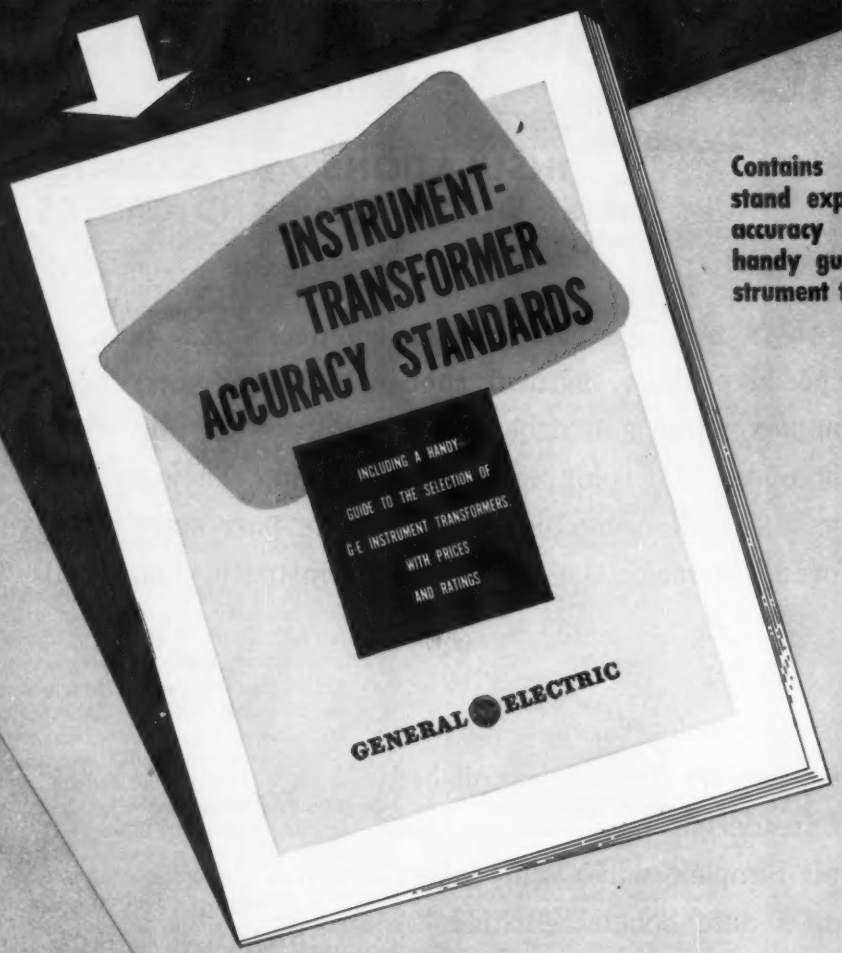
* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

IF YOU USE INSTRUMENT TRANSFORMERS
YOU NEED THIS NEW BOOKLET


INSTRUMENT-TRANSFORMER ACCURACY STANDARDS
INCLUDING A HANDY GUIDE TO THE SELECTION OF G-E INSTRUMENT TRANSFORMERS WITH PRICES AND RATINGS
GENERAL ELECTRIC

Contains an easy to understand explanation of the ASA accuracy standards, with a handy guide for selecting instrument transformers.

YOU will find this new 56-page booklet jam-packed with helpful information. It tells, for example, how to classify transformers for accuracy, how to evaluate the effects of transformer errors on meter readings, and explains the significance of accuracy classes and burdens.

Also, there's information on more than 50 standard types of G-E instrument transformers for both indoor and outdoor use. Prices, ratings, and ASA and NEMA accuracy classifications are given—all easy to find.

If you need a copy of this new booklet, clip and mail the attached coupon. *General Electric Co., Schenectady 5, N. Y.*

Headquarters For Electrical Measurement

YES I have need for a copy of your new booklet (GEA-4240) to help in the selection of instrument transformers.

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GENERAL ELECTRIC

A REPORT OF PROGRESS

SYNTHETIC RUBBER

INSULATIONS AND SHEATHS ON SIMPLEX WIRES AND CABLES

During the past few months a new synthetic rubber compound has been developed to replace each special purpose, natural rubber insulation and sheath that has been used on Simplex wires and cables. The results seem miraculous but they are not the result of wishful thinking or crystal gazing. They are solid facts, based on knowledge and skill accumulated during the past sixty years, which make it possible for us to make the most of new insulating materials and do it quickly.

If you use insulated wires and cables for any purpose you will be interested in what we have accomplished with the synthetic rubber insulations and sheaths that are now being used on all Simplex wires and cables. The story is told in an up-to-date booklet entitled "A Report to Industry on Simplex Synthetic Rubber Insulations." It is now being printed and we would like to send a copy to you as soon as it is ready for distribution. A request by postcard or letter to the Simplex representative nearest you or direct to us at Cambridge will have prompt attention.

Simplex Wire & Cable Co., 79 Sidney Street, Cambridge 39, Mass.

ARMY (E) NAVY

M★★★

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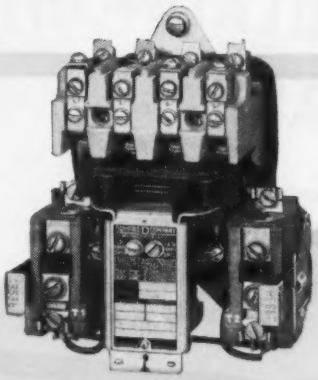
SQUARE D *Announces*
A NEW OVERLOAD RELAY



FOR SEPARATE MOUNTING— OR FRONT MOUNTING ON SIZE 0 AND 1 STARTERS

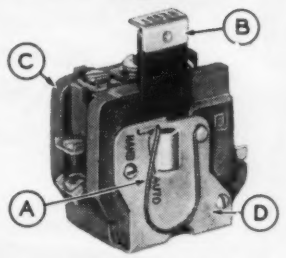
New Type AR Overload Relays provide an easy yet positive method of changing from automatic to hand reset. Adjustability of the tripping point affords greater accuracy of overload protection and flexibility of application. Terminals are large and easily accessible.

• Automatic reset overload relays are useful whenever starters are mounted in remote or inaccessible locations. They are particularly well suited for built-in machine tool control because they eliminate costly external reset mechanisms. No extra charge is made for these automatic reset devices on starters or machine tool control panels.

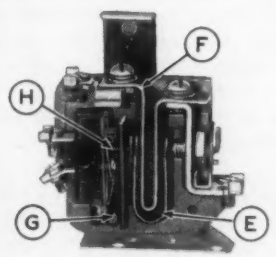
For complete details call in your Square D Field Engineer or write for Bulletin 201.

SQUARE D CO., 1318 E. 16TH ST., LOS ANGELES 21, CALIF.

AUTOMATIC RESET

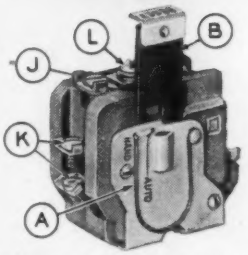


With spring wire clip (A) in hole marked "Auto" and reset slider (B) depressed, relay is in automatic reset position. Insulation blocks (C) are cold molded non-carbonizing material, wax impregnated to prevent absorption of moisture. Steel reinforcing plate (D) protects against breakage and serves as front mounting bracket.

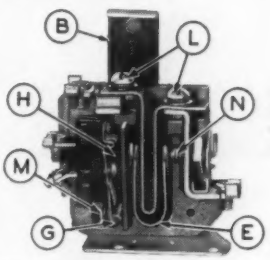


Floating bimetal trip element (E) is "U" shaped to fit around heater (F). This unusual design automatically compensates for any slight variation in shape or location of heater. Change in ambient temperature has little effect on the high temperature bimetal. With cam (G) in ◀ position, contacts will automatically reset after bimetal cools and releases tripping pin (H).

OR HAND RESET



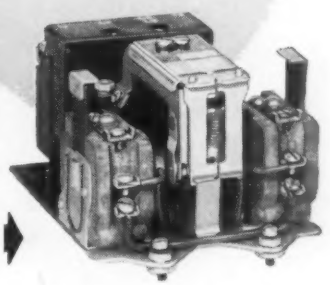
Moving spring wire clip (A) to hole marked "Hand" releases reset slider (B) and provides hand reset operation. Note husky size of load terminal (J) and control terminals (K). Heater units are firmly attached by screws (L) but are easily installed or removed from the front even after starter is mounted and wired.



With cam (G) in ▶ position, the contact mechanism goes overcenter when trip pin (H) is pushed as bimetal (E) expands with heat. Silver contact tips at (M) remain open until operation of reset slider (B) turns cam (G) to ◀. Mechanism is trip-free, thus the snap action contacts cannot be held closed against an overload. Note screw (N) which serves as stop for bimetal, also providing adjustment.

Simple means for adjustment of the trip point from 85% to 115% of nominal rating is a valuable and unique feature of this new Type AR overload relay. It permits changes in setting to take care of variations in ambient temperature or load conditions at the motor. In addition, overload protection is not limited to the usual selection of heater sizes since intermediate points can be obtained, easily and quickly.

Type AR relays are designed for maximum accessibility and ease of wiring. Photograph of starter shows how load terminals are out in front for easy wiring, while control terminals are at bottom, away from other parts. Thus, it is very easy to connect overload relays of several starters in series, or to wire additional relays in the circuit. Likewise, it is easy to convert a standard starter to 2 wire separate control.



SQUARE D COMPANY

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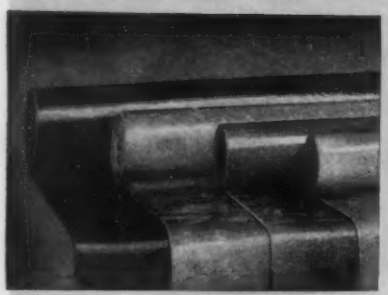
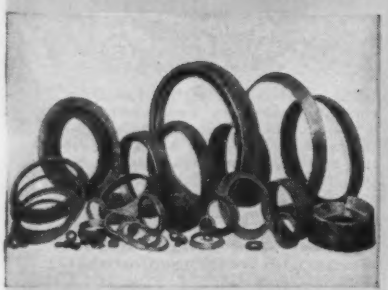
MICA INSULATOR COMPANY

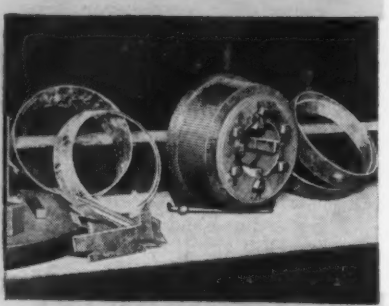
. . . makers and marketers of electrical insulations since 1893, announce, as its new West Coast sales representatives. . .

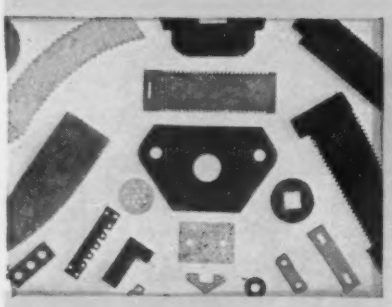


CAREFULLY SELECTED to facilitate impregnation, the base fabrics of EMPIRE Varnished Cloths and Tapes include canvas and duck—used where thickness and greater mechanical strength are required—and silk, rayon and fine cambrics, for use when insulating space is at a premium. EMPIRE varnishes, yellow or black, are formulated under laboratory supervision—and are chosen for their ability to penetrate the base material and to provide a smooth surface.

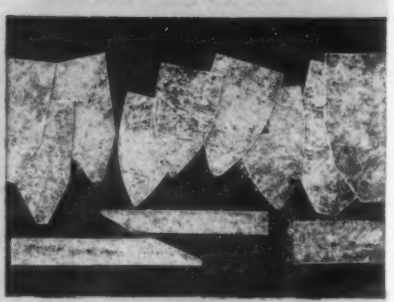


COMMUTATOR VEE-RINGS, specially fabricated to customer specifications, comprise one of the widest uses for MICANITE, the original and trade-marked product of Mica Insulator Co. Built-up mica splittings, bonded with selected resins provide high dielectric strength and flexibility of design to Micanite Vee-Rings, which are available as one or two piece rings or as sectional, fitted rings (for very large commutators.)





THE INHERENT, HEAT-RESISTING PROPERTIES of mica make it ideal for the insulation of heating units in electrical apparatus or appliances. MICANITE heater plate, capable of withstanding temperatures up to 1800° F. can be fabricated to manufacturers' specifications, within thickness tolerances which average plus or minus three mils.



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TRIANGLE-PACIFIC CO.

Los Angeles, Cal. . . . . 340 Azusa Street
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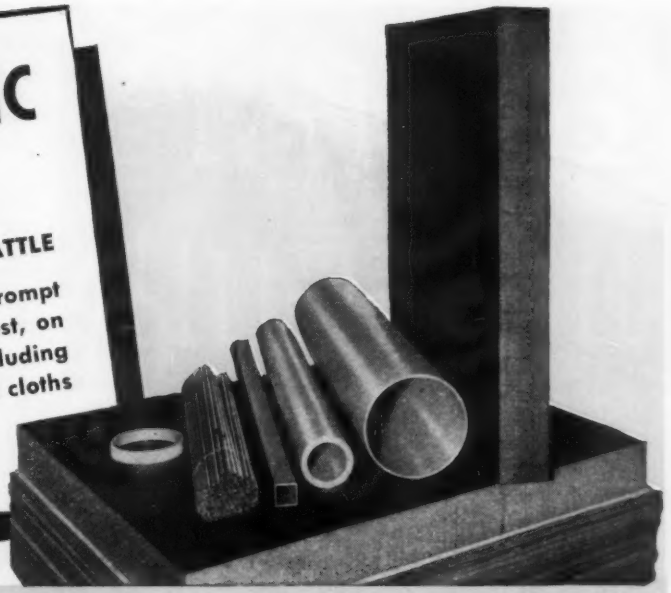
MICA

THE TRIANGLE-PACIFIC COMPANY

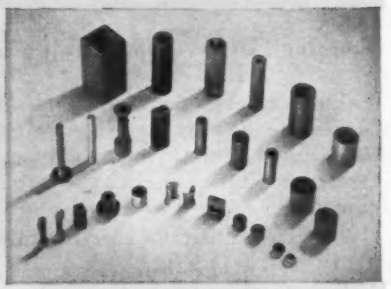
OF LOS ANGELES, SAN FRANCISCO AND SEATTLE

Triangle-Pacific is fully equipped to furnish prompt and expert service to the growing industrial west, on the complete Mica Insulator Company line, including LAMICOID plastic laminates, EMPIRE varnished cloths and tapes, MICA and MICANITE.



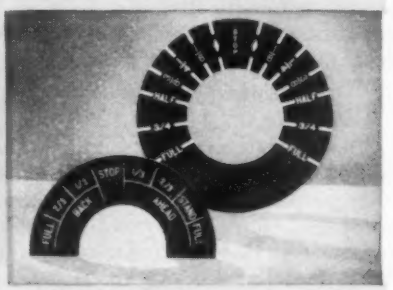
MECHANICAL LAMICOID offers high mechanical strength, dimensional stability and resistance to moisture and shock. Strong, dense and nonhygroscopic, it is easily punched, sheared, sawed or machined into intricate shapes. Available in rods and tubes with a wide range of diameters, and in sheets (36 x 42 standard size) in all thicknesses.

ELECTRICAL LAMICOID is manufactured particularly for applications requiring low power factors and low dielectric loss at high frequency ranges. Widely used in the manufacture of insulating components in the electrical manufacturing and electronic fields, it is suitable for both high and low voltage uses.



ENGRAVING LAMICOID—A combination sandwich-type opaque laminated sheet which permits pantograph engraving or sandblasting. Also furnished in translucent form for uses requiring "rear" illumination of dial, signs or indicia. Ideal for uses requiring small quantities.

Fabrication facilities for all types of electrical, mechanical and engraving LAMICOID applications are available through our fabricators at the addresses below:



BRANCH OFFICES

For convenient and expert service, call upon the Mica Insulator Company representative at the following branch office addresses:

Chicago: 600 West Van Buren Street • Cleveland: 1276 West 3rd Street
Detroit: Book Building • Cincinnati: 3403 Hazelwood Avenue

INSULATOR COMPANY

200 VARICK STREET, NEW YORK 14, N. Y.

ELECTRA'S HUSBAND

Why Not Talk Sense?

"STOP that muttering," Electra said the other night as we sat in the living room after dinner. "Can't you see that I'm trying to listen to the radio?"

"Radio be hanged," I said. "Can't you see that I'm trying to make sense out of a WPB order? They are getting worse than the selective service people were about drafting fathers. One day they say that civilian goods are to be produced and the next day some one else says that they won't. How in the devil they expect a person to plan anything for now or for postwar is a mystery."

Ignoring Electra's objections, I went on reading half aloud.

"Alarm clocks, drip pans, clothes pins, insecticide spray guns, wire garment hangers, safety pins, baby carriages, wash tubs, mechanical refrigerators . . ."

"What was that?" Electra interrupted.

"Mechanical refrigerators," I answered automatically and kept right on reading. "Sewing machines, vacuum cleaners (domestic), electric ranges . . .

"We need one," Electra said.

"Need what?" I asked.

"A new refrigerator," she answered.

"So do a million and a quarter other people need one in the next three months," I said. "They need a lot of things. Can't you understand that that's what I'm reading about?"

"We need a lot of things too," she said innocently. "A new range, and a radio with television and a record player and new lamps and a new mattress—one of those rubber ones—and an automatic washing machine and an ironer. But don't worry, I'm not going to buy any of them when they start making them. I'm going to wait for the new models."

"If all women are like you, then you'll have a damned long wait," I commented.

"What do you mean?" she asked.

"Well the first models anyone will be able to buy will be prototypes of 1942 styles," I told her. "If you stop and think back, they were pretty good."

"Maybe so, but a lot of the ads and the articles that I read in my magazines don't say anything about that," Electra said. "They talk about new things—glass kitchens and electronics and everything automatic. That's why I'm going to wait. We don't want a lot of old stuff in our house."

"It won't be old; it will all be new," I insisted. "But it won't be any of that pipe dream stuff that a lot of hopped-up manufacturers are promising. It can't be. Those things they are talking about will take months or even years to develop. In the meantime, unless folks start buying, there won't be any work to keep factories running and people busy. Then you start one of those downward spirals and everything goes blooey."

"Then why do people who write the articles and ads make such promises?" She asked. "Why don't they talk sense?"

"You tell me," I answered. And we let the subject drop.

BECAUSE I once expressed an innocent wish to get out of a business as complex and competitive as the electrical industry and take up something simple like farming, Electra keeps harpooning me (you see, she was raised on a farm). Her latest contribution was a clipping from a dairy paper—the *Dairyman's Price Reporter*. Here it is:

How a Government Directive Is Born

It all began with the following:

Little Boy Blue, come blow your horn;
The cows are in the meadow
The sheep are in the corn;
Where's the boy who looks after the sheep?
Under the haystack fast asleep.

An average writer took it up with this letter:

Dear Little Boy Blue:

Just a few lines to remind you about blowing your horn. I notice that the cows are in the meadow; also that the sheep are in the corn.

I am looking into the case of the boy who is supposed to look after the sheep. Any information you could give me regarding the story of his slumbering under the haystack on my time will be appreciated.

Very truly yours,

Ultimately a Washington bureaucrat took over:

Gentlemen:

In accordance with an Act of Congress passed June 6, 1943, we have conducted an intensive inquiry into the need for an adequate signal system in meadows and adjacent territories. The whole matter of stabilizing practices in these areas is being processed with a view to attaining the objectives in the mandate of July 7.

Considering the matter in the overall global aspect, it is the conclusion of our policy committee, following repeated hearings, that the following steps are necessary to restore confidence and maintain morale:

1. Immediate stimulating of the whole horn-blowing project.

2. A directive with reference to the proper number of blasts to be blown when cows are in the meadow.

3. A signal system requiring a signal easily distinguished from the former when the sheep are in the corn.

4. An immediate "blue" when the livestock has left; and a "red" signal in the cases where the cows and the sheep have left but may return.

5. Authorization for a complete study of the whole farm situation and a check-up of the bugle crisis, with possible freezing of bugle calls at April levels in accordance with the Little Haystack Formula.

6. A census to determine how many boys in the country are under mandate to look after the sheep.

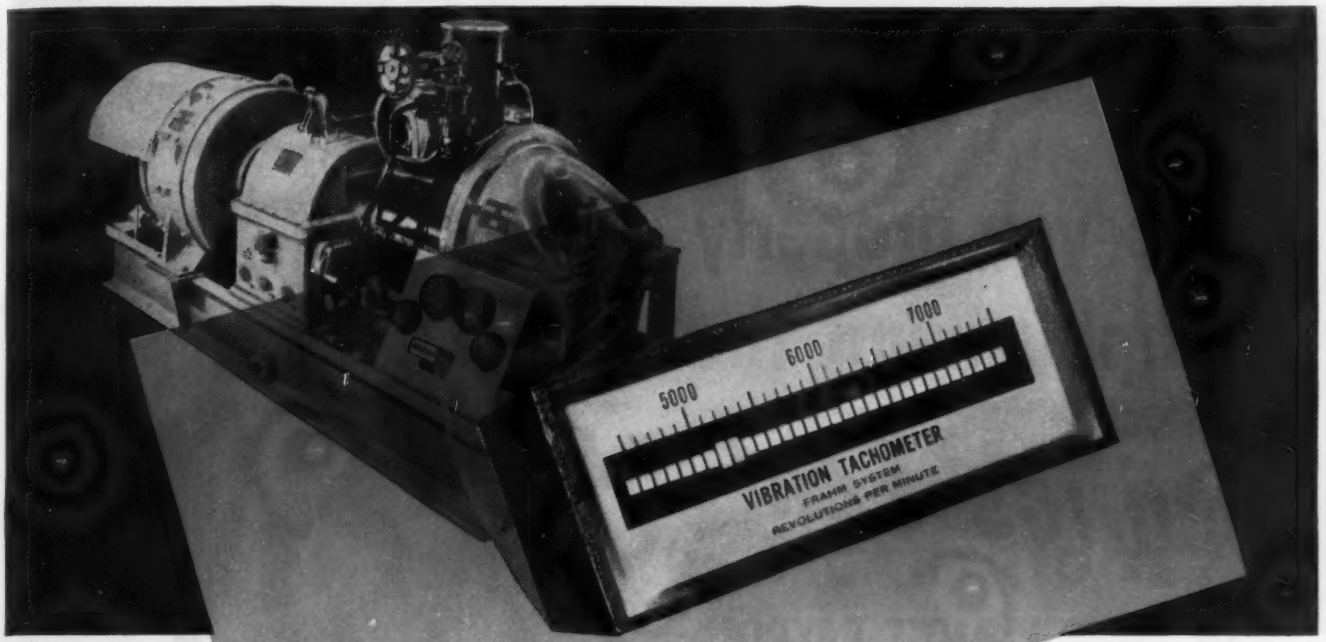
7. A study to determine whether these boys are subject to abnormal indolence or excessive slumber.

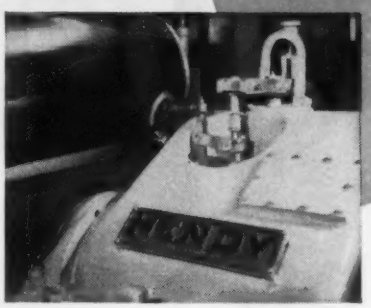
8. An appropriation of five million dollars to provide adequate handling of the haystack matter, to insure adequate distribution of horns and to take all necessary steps to integrate, codify and coordinate all authorized operations.

For the purpose of keeping our files accurate, will you inform us of your correct name? It appears in our records variously as L. Boice Blow, Little B. Gloo and L. Ittle Boybluh.

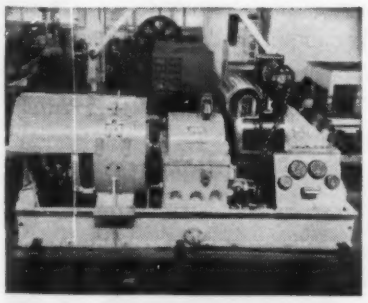
Very respectfully yours,

U. S. Cow, Sheep and Haystack Administration, Washington, D. C.





The simplicity of the Hendy governor is shown in this view. Power unit for the governor is an integral portion of the reduction gear assembly.



Over-all view of the 300 kw, 220/440-volt Hendy Turbo-generator, showing the sturdy welded steel bedplate and the compact arrangement of the complete set.

RIGHT ON THE NOSE

AT 5250 R.P.M.

Two important factors are brought out by that statement . . . first, Hendy Turbo-generator governors *hold* speed accurately regardless of load fluctuations; second, Hendy engineers, in their search for new and improved methods and materials, have made another valuable contribution to the operating efficiency of power-producing machinery.

The governor on Hendy turbines is greatly simplified over former types, requires no stuffing boxes or soft packing, utilizes anti-friction bearings in the linkages, and is enclosed within the gear-case. Individually, none of these new practices would materially affect closer speed regulation—but together, and combined with precise workmanship, they assure fine speed control over the entire range of no-load to overload conditions—resulting in uniform generator performance.

Hendy Turbo-generators are available for a-c or d-c output—from 250 to 750 kw capacity. Inquiries are invited on these standardized units—as well as on larger plants that will be available in the near future. Write for new booklet which gives more complete information.

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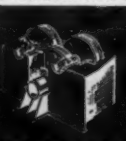
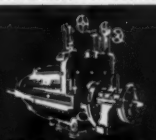

REDUCTION GEARS


STEAM TURBINES

DIESEL ENGINES

Are you properly emphasizing the SAVINGS FEATURE OF YOUR PLANT'S PAYROLL SAVINGS PLAN?

WITH the war swinging into its tensest phase, now's the time to emphasize over and over again the *savings* feature of your Payroll Savings Plan. To press home to all your people the need of building up their savings—the need of building up their savings not only in wartime but also in the years directly after the war. To point out that a bond cashed before its full maturity is a bond killed before it has given its fullest service to its owner—*or to his country!*

Buying War Bonds, holding War Bonds, and keeping wartime savings mounting—all are absolutely vital. But no one of these is enough by itself. The *savings habit* must be carried over into the years of reconstruction which will follow the war. For if, at war's end, we have 'flash-in-the-pan' spending, *everybody loses.* The spender loses, you lose, and the country loses! While a working public, convinced of the value of continued, planned saving, is the soundest possible foundation for private enterprise of every sort.

We call these bonds War Bonds—and with their aid we will win this war at the earliest possible moment! But they're Peace Bonds, too—and, rightly used, they will win for their holders, *and for all of us,* a happy and prosperous place in the years of peace to come.

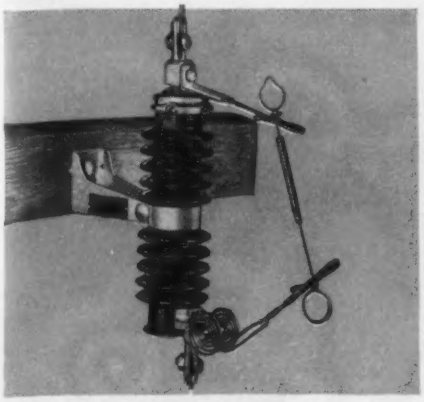
WAR BONDS to Have and to Hold.

The Treasury Department acknowledges with appreciation the publication of this message by

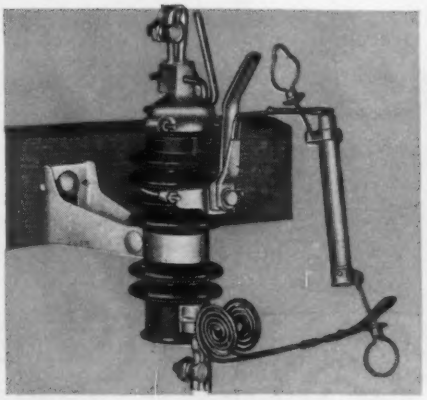
ELECTRICAL WEST

★ Let's All Back
★ the Attack...
★ with War Bonds!

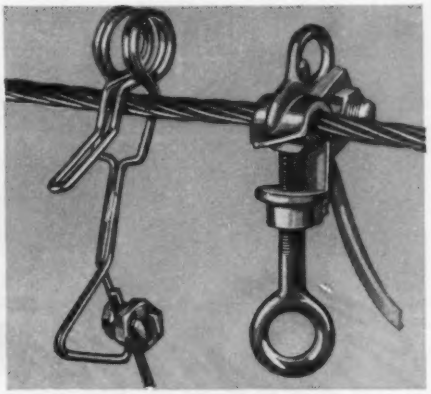
This is an official U. S. Treasury advertisement—prepared under auspices of Treasury Department and War Advertising Council



LOW MASS, extra-flexible switch parts mean high resistance to mechanical shock and heavy short-circuit rupturing capacity.



LIGHTNING STROKES dissipated through low resistance path to ground. Power follow-up interrupted within the horn fibre fuse tubes.



CLAMPS. There is a Kearney Con-nec-tap clamp for the most unusual load or construction problem. Made in many types for all wire sizes.

ELIMINATE CHARRED CARTRIDGES

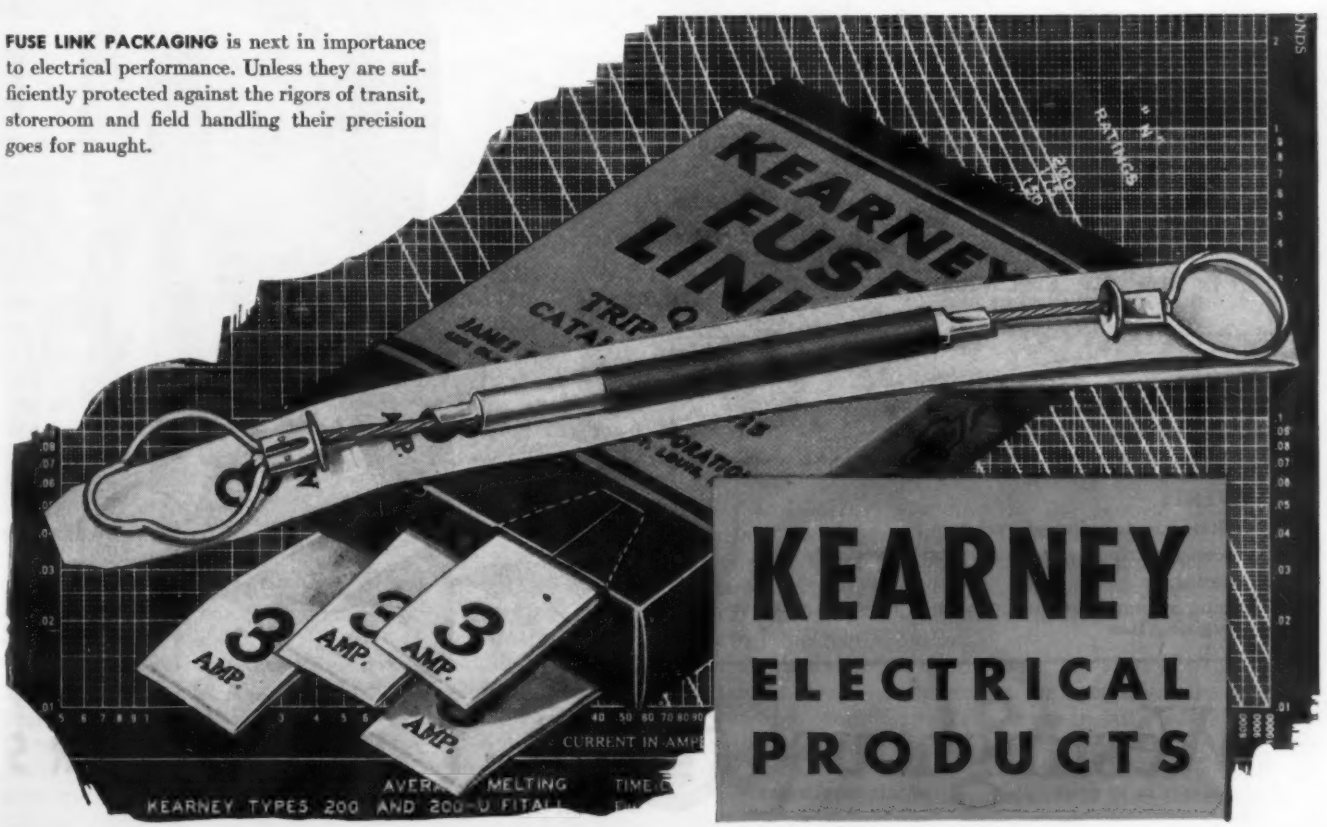
All Kearney fuse links are designed to operate at full load well below the charring point of fibre —the material used as a liner in all cutout cartridges. You may have had failures of cutout cartridges on heavily loaded lines, but not if you are using Kearney fuse links. Or, your cutout cartridges may be operating on the ragged edge where there is not enough heat to cause actual charring, but quite enough to desiccate the tube to the point where the rupturing capacity of the cutout is greatly impaired.

In easier days when lines and fuse links were carrying only a fraction of their rated loads the temperature margin of safety was sufficient. With today's loads you are inviting certain trouble unless you know the operating temperature of your fuse links and cutouts at full load current. If you haven't investigated ask your supplier for this information or better still change to Kearney—the fuselinks with the low temperature characteristic. Your inquiry on this subject will be welcomed by Dept. "H."

JAMES R. KEARNEY CORPORATION,
4236 Clayton Ave., St. Louis 10, Missouri

LOW TEMPERATURE — POSITIVE — INTERCHANGEABLE

FUSE LINK PACKAGING is next in importance to electrical performance. Unless they are sufficiently protected against the rigors of transit, storeroom and field handling their precision goes for naught.



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UNNECESSARY OUTAGES

on rural lines with the new Westinghouse AR-1 AUTOMATIC CIRCUIT RECLOSER

Here's a double-barrelled answer to unnecessary outages on rural lines—the new Westinghouse AR-1 AUTOMATIC CIRCUIT RECLOSER.

1. On temporary faults, the recloser restores service after opening and clearing the fault. This eliminates over 80% of unnecessary outages and service trips.

2. On permanent faults, the recloser locks out after attempting to restore service three times.

Due to time-lag tripping, only the recloser nearest the fault opens even once. Accurate co-ordination with other reclosers and standard fuses is possible only with time-lag tripping. Length of line out of service is reduced to an absolute minimum.

The recloser gives ideal protection to important loads, avoids revenue loss on dead lines and builds customer good will through better service.

Complete tables and charts on how to co-ordinate the recloser with other circuit protection are yours for the asking. Write today for booklet B-3329. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N.

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TIME-LAG TRIPPING

PERMITS

Co-ordinating reclosers with each other and with fuses
Burning faults clear and restoring service
Energizing line after lock-out without by-pass switch

PREVENTS

Simultaneous tripping of reclosers
Unnecessary tripping on momentary overloads
Chattering
Tripping of immediate and preceding reclosers when re-energizing line

Westinghouse
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

AR-1 RECLOSERS

ELECTRICAL WEST

AUGUST, 1944
VOL. 93 NO. 2

ELECTRICITY MAKES THEM FLY

B-29—Boeing Pho

R. E. Johnson

General Electric Co.
Los Angeles

IN THESE days, when we confidently speak of producing 100,000 airplanes a year in this country, few realize that literally billions of dollars in airplane equipment are being contributed by the electrical industry. This equipment varies all the way from tiny lamps, both incandescent and fluorescent, to flying suits; from flea power motors to types developing several horsepower; from diminutive batteries to generators having kilowatt ratings in two figures; from delicate instruments to hot water heaters; from position indicators to ordnance control; from radio to robot pilots. And temp-turbs and turbo-superchargers should be included too because, although they are mechanical devices, they were born of the world of electricity.

Competent authorities estimate that, since the present war started, aeronautical engineering has advanced the equivalent of at least 15 years of peacetime progress. Airplanes have rapidly become faster, larger in size, and exposed to the extreme conditions of pressure and temperature, imposed not only by high-altitude flying, but by ambient conditions encountered in many parts of the world. Driving sand and dust storms in North Africa constitute one problem, with the Aleutians offering another extreme of bitter cold. Both offered serious obstacles to equipment during flying and ground servicing operations. Humidity and corrosion comprise other important and difficult operating conditions with which we all are more or less familiar.

Large bomber airplanes require intricate bombing and control mechanisms to perform their prime function —plant bombs on the target. Armaments of multiple, heavy caliber guns in automatic power turrets, these applications and many more, opened up opportunities for electricity to do a better job. At the same time, the attendant operating conditions became much more severe, and standards of reliability, minimum space and weight were more stringent than ever before.

Among the severe operating conditions vitally affecting operation of electrical equipment, is extremes of temperature. This may be a function of latitude and of altitude. With our fighting planes regularly operating at altitudes in excess of 35,000 ft., temperatures of minus 65°F. are regularly encountered, even in the tropics. In contrast, ambient temperatures as high as plus 160°F. are commonly reached in some parts of an airplane when standing in the intense desert heat. And the same airplane and equipment should be suitable for world-wide operation throughout such wide temperature ranges without change or modification.

Variations in altitude also incur changes in air pressure, ranging from 14.7 lb. per sq. in. at sea level, to 2.72 lb. per sq. in. at 40,000 ft. Resulting problems of heat dissipation and ventilation are among the *minor* problems

which electrical designers encounter.

Vibration and acceleration constitute major problems. They are present in some degree in all parts of the conventional airplane. Acceleration values of 75G are commonly encountered on the cylinder head of the engine. In comparison, a human being may be rendered unconscious when subjected to acceleration values of one tenth this figure. As a corollary, the tail gunners on some of the large bombers can readily testify that acceleration close to 25G may be encountered if the tail of the airplane is slapped on the ground during landing. At present, a standard vibration requirement for aircraft relays and control devices is successful operation over a range of mechanical frequency of 5 to 55 cycles per second, at a maximum amplitude of 1/32 in. (1/16 in. total travel).

There are certain requirements for aircraft equipment, including electrical, which to the aircraft industry are almost axiomatic. Maximum reliability probably tops the list, with minimum weight and space requirements following closely. Simplicity, ease of installation, and satisfactory life are important, with price taking a place of somewhat secondary importance during the war.

Use of direct-current still predominates in airplanes, having progressed through 6-volt, 12-volt, and 28-volt systems, with a few at 125 volts. The so-called 28-volt d-c system is almost universal and will probably continue through the war period. The Martin Mars uses the 125-volt d-c system, but for some other large airplanes being developed, a-c systems of 400 cycles, three phase, 208/125 volts will be used. Thus the industry will have aircraft equipment available or being designed for these systems: 6 or 12 volt d-c for very small planes; 28 volt d-c for small and medium sized planes; 28/125 volt d-c for large, medium altitude cargo or transport planes; 208/125 volt, three phase, 400 cycle a-c for large, high-altitude, long-range planes.

A-c rotating equipments have a major advantage over similar d-c units in that fewer brushes are required. Good brush life is seriously affected by operation at high altitude, although diligent research is helping to remedy this situation.

Power operated gun turrets for airplanes constitute an outstanding development of this war. The electrical industry has developed a 24-volt d-c amplidyne drive and control system admirably suited to this application, and large quantities of such units and equipments are being used on the Consolidated B-24 Liberator, Douglas A-20 Havoc, Martin Baltimore, Navy Grumman Avenger, and the North American B-25 Mitchell bombers. All these power turrets carry two 50 caliber guns and are easily and accurately operated under extremes of airplane flight.

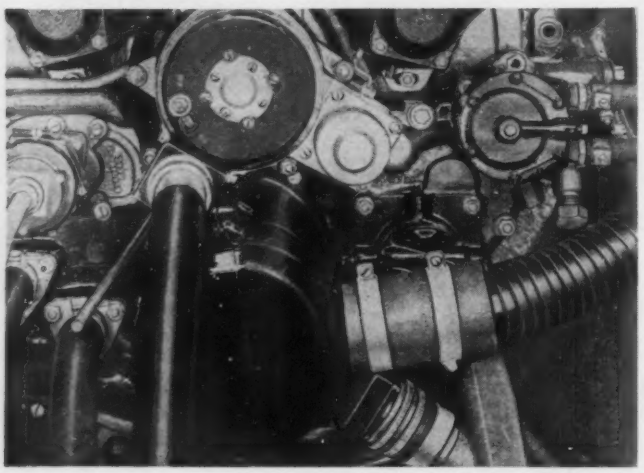
These electrically controlled armaments require reliable and adequate power generating and distribution systems. On the current high production bombers and fighters, one 200-amp. 30-volt, 6-kw. d-c generator per engine is customary. These generators weigh about 7 lb. per kw, are controlled by voltage regulators and reverse current relays and operate in parallel on a distribution system using batteries for peak loads.

The distribution systems are not simple by any means. With lines running to all parts of the airplane, problems of proper load division, and electrical projection, have required short circuit studies as complicated as those encountered in central station practice. Before the war, electrical conductors were commonly enclosed by metallic sheathing, duct or conduit. But today every effort is made to use open wiring with a minimum of cabling. It has been demonstrated that a bullet causes much less damage, and the open wiring practice lends itself to rapid servicing and replacement in the field—factors of paramount importance.

Aircraft radio and communication systems have made amazing advances. In the old days, among the more trouble-making of electrical installations, they are today among the most reliable. One large manufacturer advertises that his 1944 aircraft radio equipment is less than one eighth as bulky and one fifth as heavy as it was in 1940. Further, that it does a far better job, provides at least two frequency ranges, and can hardly be compared for ease of servicing and accessibility. Variations of electronic equipment, which can scarcely be mentioned above a whisper now, will prove as indispensable for commercial postwar flying as they are fighting aids in the air today.

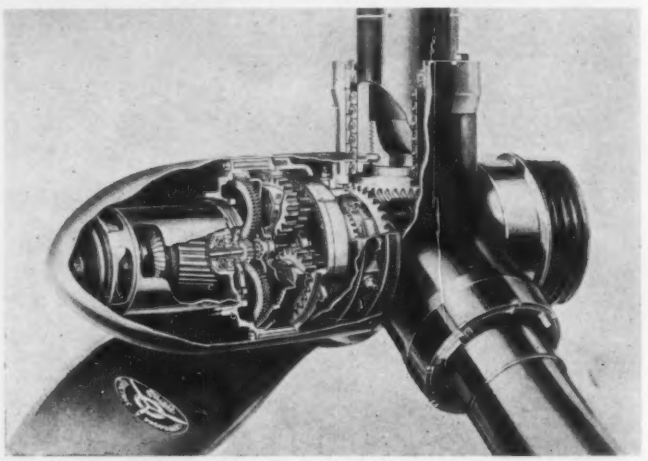
Replacing the old magnesium flare, electric lighting is universally used in airplanes. Tiny lamps for bomb sights, others for passing signals, landing and recognition are only a few of many applications. In 1940, only four types of sealed-beam lamps were available: now there are 48, most of which are used in aircraft.

One very valuable unit is a 4-watt fluorescent type lamp emitting near-ultra violet energy capable of producing fluorescence and still having invisible rays. With a simple rheostat, the pilot can change the intensity of fluorescence on the instrument dials to meet stringent requirements of night flying.



A 300-amp, 30-volt d-c generator mounted in plane's engine. Space utilization results in a service problem

Cutaway section showing a special aircraft motor installed in the hub of a Curtiss electric airplane propeller



A Martin "inhabited' 'turret undergoes rigid firing tests before installation

Great advances have been accomplished in the use of electric motors and controls, both as devices and as included in systems. Some of the new large transport planes will require in excess of one hundred motors per plane, and large bombers even more than that number—up to 250 in some cases. The motors range in capacity from a few watts to several horsepower and, in order to save weight, are designed for high speeds in the range of 7,000 to 12,000 rpm. For slower-speed, higher-torque, actuating functions such as retracting landing gear, wing flaps, bomb doors, etc., reduction gears are built integral with the motor. One of these actuator units built for the B-17 airplane is rated 1½ hp, 168 rpm., and weights 22 lb. as compared to 165 lb. for a similar rating of industrial gearmotor.

One of the problems in motor actuator application, is to stop the motor at the precise instant desired. This is essential to prevent undue stress in the airplane framework, or mechanism, if the system jams, or limit switches fail to work. For such requirements, an ingenious torque-limiting device is available for the actuator gear train. It will automatically shut down the motor, and mechanically disconnect it from the load in the event of serious overload on the system.

Remote positioning of throttles, flaps and valves offers many applications for electric motors, and the motor control system plays an important part. Automatic temperature control, operating on the modulating principle, will keep engine temperature, oil coolers, and cabin temperature at proper values by properly controlling the corresponding flaps or valves. Motors and control are the heart of the amplidyne systems used in the turrets.

With many of the functions previously performed manually by the pilot or co-pilot now being performed automatically or by remote control, many instruments are still necessary for indicating purposes and as flying aids. Pressure, temperature, speed, acceleration and position are among those functions for which indications and controls are readily accomplished with electric instruments. In fact, it is a problem to find adequate space in a modern military plane to mount the many essential instruments so they may be easily and quickly read.

A new electro-hydraulic automatic pilot system now in production, can take over the controls of an airplane and relieve the pilot of all physical effort in controlling flight. Special electrically driven gyroscopes provide electric signals, if the plane tends to change altitude or course, and these signals are amplified to correctively control the flying surfaces.

This recitation of the details on some of the devices and systems contributed by the electrical industry leads to a discussion of a few figures concerning the amount of such equipment in an airplane. Naturally, such figures applying to military airplanes are somewhat restricted, but we can say that their connected electric loads are usually greater than for commercial planes of corresponding size.

The power requirements of a hypothetical airplane, designed for the post-war transport requirements can be estimated. Assume that the four-engine plane is large, say about 200,000 lb. gross weight including over 150 passengers, baggage, express and fuel. Such a plane would offer an excellent opportunity for the application of the 125/208-volt, three-phase, 400-cycle a-c system for major power requirements, and perhaps a limited amount of 28-volt d-c power through transformer rectifiers.

A connected load of about 100 kw., supplied by four engine driven generators totaling 60 to 70 kw., would be a reasonable figure, based on present-day design practice. Of this connected load, about 95 kw. would be supplied from the 400 cycle a-c bus, in ratios of this order:

Lights	15 kw.
Motors	54 kw.
Radio	5 kw.
Instruments	150 watts
Electric heaters	21 kw.

To the 28 volt d-c system would be connected loads, or devices, inherently better suited to direct-current operation. These might total 3 or 4 kw., about as follows:

Special lights	150 watts
Special motors	1,250 watts
Instruments	250 watts
Controls and relays	500 watts
Solenoids (valves)	1,500 watts

In spite of the fact that the airplane industry has achieved tremendous progress during the present war, and in spite of the expected big drop in its production rate immediately after the war, it is a foregone conclusion that airplanes will be used on a scale that we can hardly comprehend now, and that within not too many years. We may be sure that electricity will be providing ever increasing contributions to make flying and air transport safer, easier, faster and cheaper.

Navy operator transmits a message while plane is in flight. (Navy photo)

PG and E Pioneers in FM Carrier

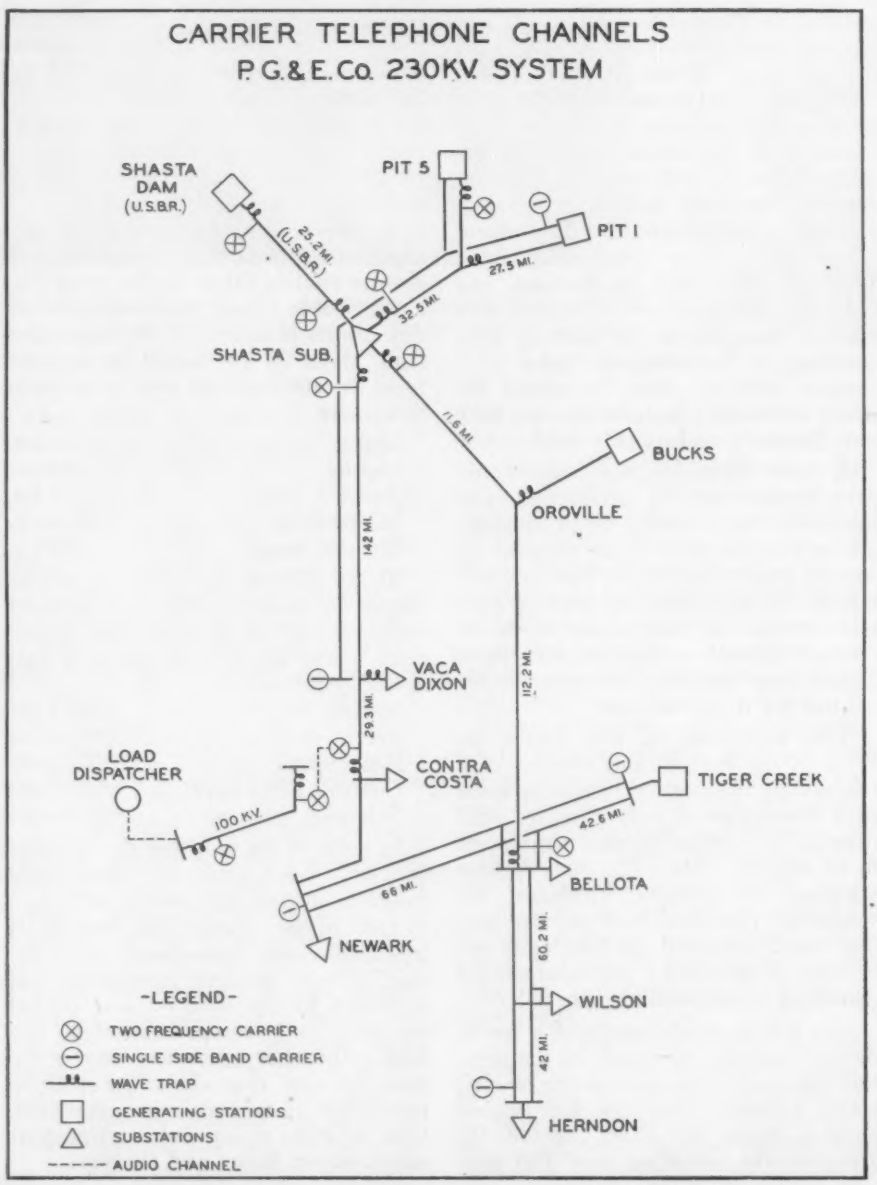
First Application of FM (frequency modulation) carrier-telephone is made on Pit 230-kv. line as part of coordinated dispatching system

HAVING been first to apply carrier current telephone communication to a 230-kv. circuit in 1927, Pacific Gas and Electric Co. has again pioneered in the field of power line carrier communication with installation of a duplex FM channel on one of its 230-kv. Pit lines between recently completed Pit 5 power house and Contra Costa substation, a distance of 218 miles. This new channel forms an important link in the company's dispatching system between Oakland and the Pit River hydroelectric plants and is part of a coordinated communication system that will consist largely of transmission line carrier circuits.

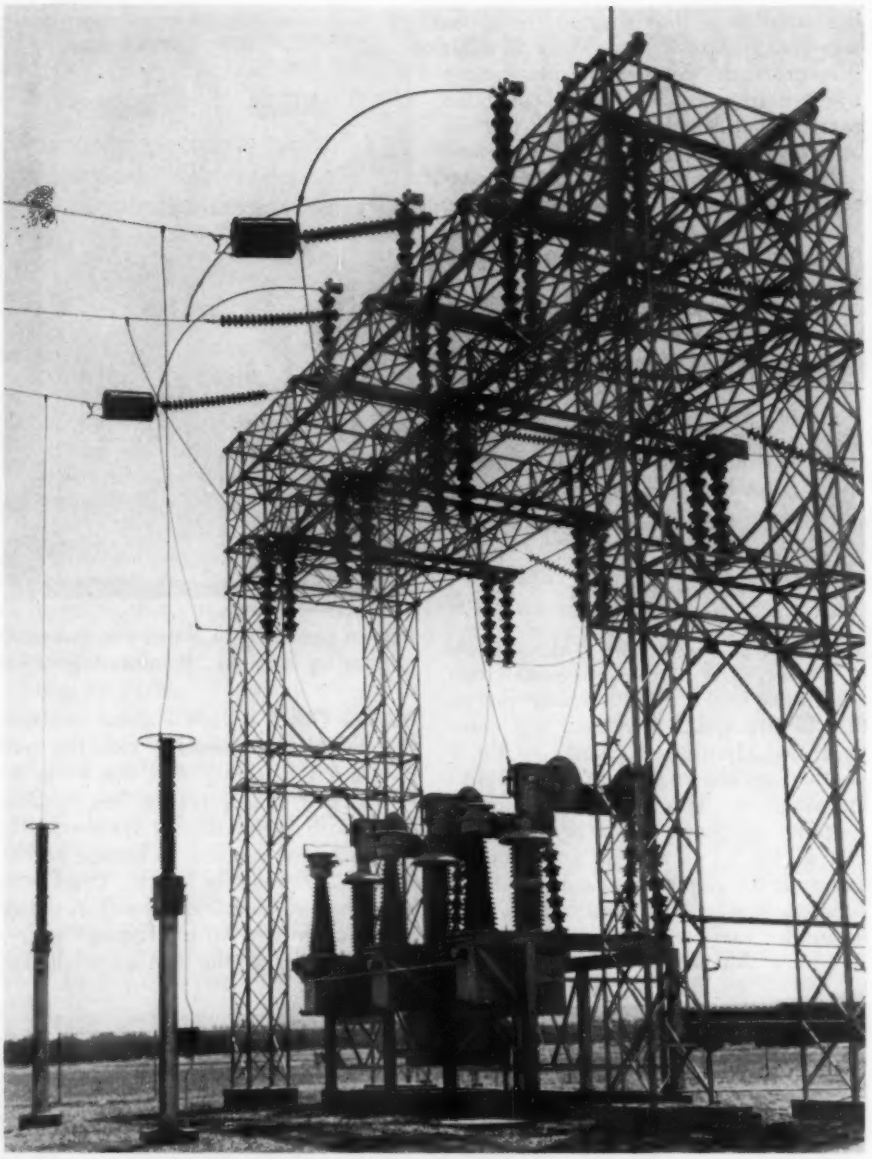
The original Western Electric single side-band suppressed carrier system between Vaca-Dixon substation and Pit 1 plant has served well for many years, but great improvements have been made since that time and there are now many conventional AM (amplitude modulation) systems in successful operation on lines of the 230-kv. class. When it became necessary to provide additional communication facilities from the dispatching office in Oakland to Pit 5 and to the government's Shasta Dam plant which now feeds into the PG and E system, consideration was given by J. P. Jollyman, chief of the division of hydroelectric and transmission engineering, and his staff, to the three types of carrier thus far developed, viz., the original single side-band, AM, and the more recently developed FM.

It had been demonstrated by E. W. Kenefake, carrier-current engineer, electronics department, General Electric Co., that an FM system operating within the 50- to 150-kilocycle band allotted for power company carrier, rather than in the 40-megacycle region of FM space radio, possessed desirable signal-to-noise level ratios that made it attractive in the power line carrier field, particularly on lines of high noise level due to corona and other causes. PG and E ordered two sets which have now been in operation since late May of this year, but to Kenefake goes all the credit for solution of the many problems involved and to him ELECTRICAL WEST is indebted for descriptive material and test data contained in this article.

In developing an FM system for transmission line carrier, the problem confronting Kenefake was not alone that of dropping from frequencies of 40 megacycles to the 50- to 150-kc. band, for that was comparatively simple, but one of so limiting band width as not to exceed that used for AM carrier in order that an equal number of FM channels could be accommodated within the 50-150-kc. range. A further limiting factor imposed upon band width was the fact that line traps and coupling condensers are designed to handle a band width of only 6 kc., and it was desirable to stay within this limit. This called for a so-called deviation of one-to-one instead of the



New FM carrier channel operates between Contra Costa and Pit 5. This will be divided at Shasta substation by installation of two more FM sets. By means of audio coupling, Shasta will then become a carrier switching station. In this manner carrier circuits may be made to conform to power flows under several normal operating conditions of the 230-kv lines in that area that join at the Shasta substation



230-kv. switchrack at Contra Costa substation. The two interphase coupling capacitors (lower left corner) and the line traps shown in two of the 230-kv. conductors are of standard 6-kc. design. The combination of line traps which prevent loss of energy and interphase coupling contributed much to success of the new FM carrier channel

much greater deviation used in FM broadcast and emergency systems. The problem becomes more clearly defined when it is considered that the FM broadcast band used is wider than the whole span from 50 to 150 kc., and even emergency FM utilizes a band width approximately one-third this range. Withal, it was desired to obtain maximum intelligibility with the minimum band width permissible. Obviously then, little of the technique developed for FM space radio with its wide band was of value in the solution of the problem.

Line Characteristics

All but 14 miles of the 230-kv. line from Contra Costa substation to Pit 5 plant, over which the new FM carrier channel has been established, was built in 1922-3. The conductor, being of rope-lay construction, presents a rough surface giving rise to considerable corona, and hence a very high inherent line noise level. To minimize line attenuation and noise level, interphase coupling, with two of the phase wires of the line acting as a pair, was used. Compared with field tests on other transmission carriers. this line showed a rather low attenuation, but extremely high noise level.

The duplex FM system installed requires two frequencies, 85 kc. being used in one direction and 125 kc. in the other. The advantage of the two-frequency duplex circuit is that in addition to being readily connected to other carrier channels it may also be connected to noisy metallic telephone circuits.

To confine the carrier to the Pit line and prevent loss of energy, line traps in the 230-kv. circuit, as shown, were installed at each end of the carrier channel and on all tap lines. The accompanying diagram shows the location of these traps as well as the general nature of PG and E's carrier applications.

These traps, one in each of the two transmission conductors at each point of application, are tuned for maximum impedance at the two frequencies used, i.e., 85 kc. and 125 kc. They not only isolate the FM channel, but serve as well to prevent admittance of noise from circuits that may be operated as part of the 230-kv. system. These traps undoubtedly contributed more to the success of the carrier channel than did interphase coupling because of this minimizing of signal loss and blocking of noise.

Noise Tests

After the sets were installed and line traps and coupling circuits tuned and adjusted, an opportunity presented itself to the manufacturer to make some very interesting comparative noise tests. These included signal-to-noise ratio of the new FM vs. AM vs. single-band. The theoretical noise reduction of single side-band over double side-band AM was closely checked on an equal power and band width basis and it was found that the gain in signal-to-noise ratio was 4.4 db. (decibels or sound units) as compared with a calculated value of 4.8 db. Comparisons of FM and AM on an equal power basis indicated FM to be superior by about 12 db., the limits of readings being 9 to 16 db. That is to say, on the average, the signal-to-noise ratio on FM was about 32 db., while on the double side-band AM it was of the lower order of 20 db., a very significant gain.

Kinds of Noise

There are two basic kinds of noise encountered in power line carrier applications. One is that due to radio frequencies produced by electrical disturbances such as corona, leakage, switching, etc., and the other is what may be termed corona modulation. The latter is amplitude modulation of the carrier due to a variable attenuation phenomenon caused by the corona. At the carrier power levels used in the tests the greater part of the noise found was of the former or radio frequency type. Laboratory tests had indicated, however, that the advantages of FM over AM would be greatest if the noise were predominantly of the corona modulation type.

The effect of line traps under switch-

ing conditions that shorted them out was also observed during the tests. If certain traps were made inoperative by switching, it was found that the carrier channel changed from a good one to one over which it was very difficult to communicate. This apparently was due to increase in noise level and loss of energy in the sidebands and held true alike for AM and FM systems.

The tests also afforded an opportunity to secure comparative noise level data on several methods of coupling. It was found that, with phase-to-ground coupling, line loss was about 6 db. greater than with the interphase coupling that had been provided. Moreover, noise level was approximately 2 db. more with the phase-to-ground coupling.

Carrier Program

In addition to the two FM sets now operating, it is planned to install two additional sets at Shasta substation so that Contra Costa to Shasta will comprise one circuit and Shasta to Pit 5 another, as shown by the accompanying diagram. This will permit audio coupling at Shasta for a through circuit to Pit 5, as well as audio coupling with the government's AM carrier between Shasta plant and Shasta substation for various other combinations.

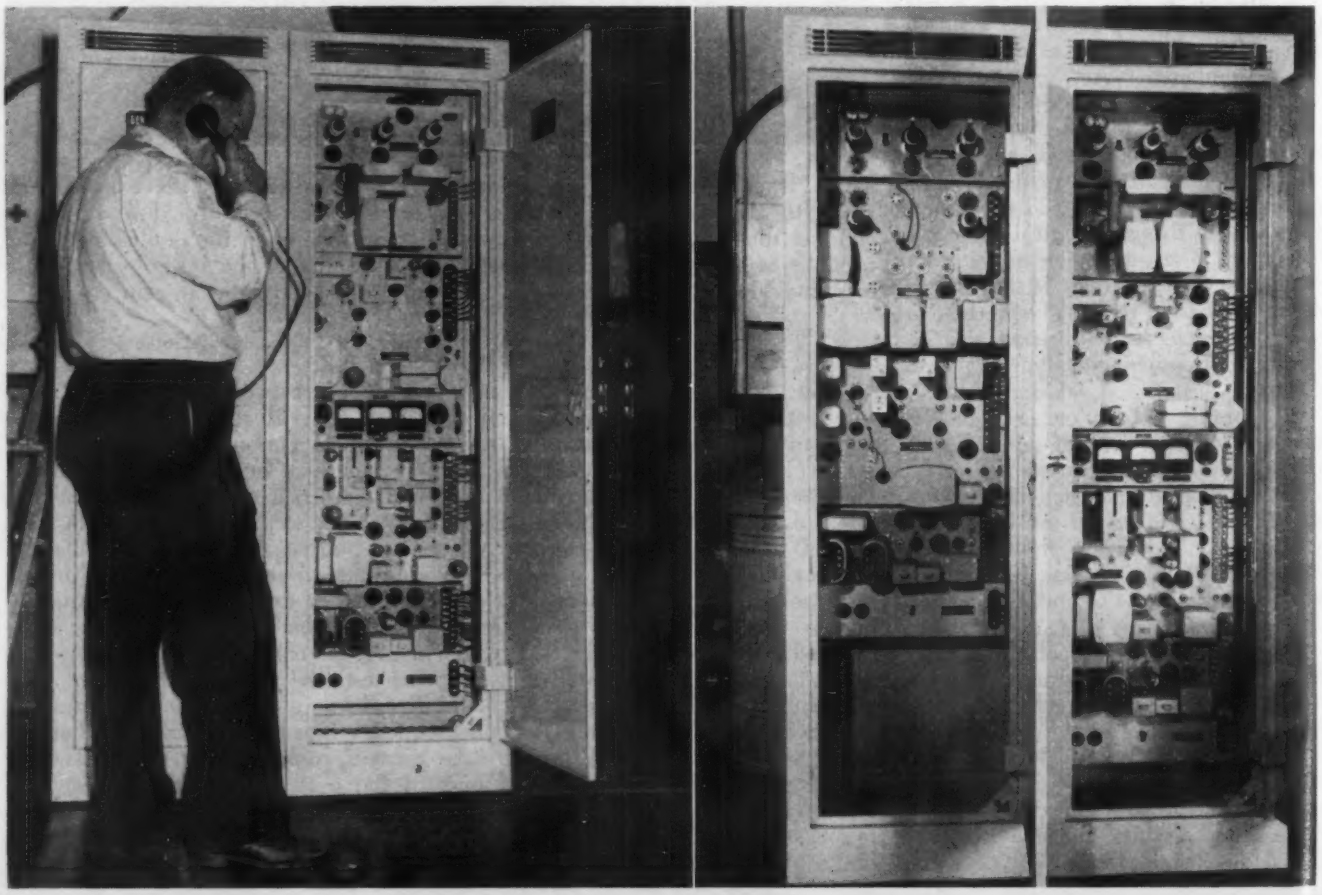
A new AM carrier channel to be established between Shasta substation and Oroville-Bellota, likewise may be audio coupled to either of the above. This will permit readily setting up carrier communication channels that will correspond or conform to power flows over the transmission lines, a feature very desirable from an operating standpoint. In other words, if Shasta plant is feeding straight through to Bellota, and the Pit plants to Contra Costa, then each transmission circuit will have a direct carrier circuit. If Shasta feeds to Contra Costa and Pit to Bellota, which is the other of two normal operating conditions, then the carrier channels at Shasta substation will be so audio coupled as to accomplish the same through communication circuits corresponding to power flows.

From Contra Costa to station X in Oakland there will be a 110-kv., AM carrier audio coupled to a wire line extending to the system dispatching office, also in Oakland. With the two carriers audio coupled at Contra Costa, the system is then complete.

Various other circuits that go to make up a coordinated carrier telephone system over PG and E's 230-kv. lines, also are shown on the accompanying carrier channel diagram. In addition to the carrier communication channels here discussed, the utility has an equally comprehensive program for carrier relaying as well.

Above photograph shows the two neat appearing cabinets in closed position

Contra Costa is terminus for two carrier telephone channels, one the new FM to Pit 5 (right), and the other an AM circuit over a 110-kv. line to Oakland. Both being duplex systems, they will be audio coupled to form a carrier circuit 247 miles in length. Lead wire from the two coupling capacitors shown in an accompanying photograph is carried directly to the FM panel board



Safety Taught by Job Performance

By having workmen actually perform typical jobs on several spans of line built for the purpose, Colorado utility hopes to evolve a Recommended Work Procedures manual to supplement its safety rules

*J. E. Wilson**
Colorado Central Power Co.
Golden, Colo.

SAFETY is not like a suit of clothes that may be worn one day and discarded the next. It must be *thought, taught* and *practiced* every day by every man on the job from the top down to the rawest recruit. There should be no lag in the safety program until an accident occurs and then a pressure program be carried out that leaves employees with more resentment than sympathy for it.

Like many other companies, Central Colorado Power Co. has a safety manual. This book was developed with the intent that it be a manual of recommended practices, rather than a rule book. This intention has not been accepted in all cases. There has been a tendency from time to time of various employees suggesting that rules be changed or revised. This is a healthy situation in that it shows that employees are reading and thinking about the manual. On the other hand, the acceptance of suggestions as rules leads to a certain amount of resistance to some of the recommendations. The company has recently instituted what it terms a Visual Safety Program. From this program and the resulting discussions, it is hoped to evolve a manual that will be called *Recommended Work Procedures*, or some such designation, to more or less replace the safety manual.

The visual type of safety program is not an original idea with this company. It is followed by many companies as a standard program, while others follow it to some extent by having discussions within a gang, or at various times when some particular problem arises.

In spite of the fact that employees have studied the company's safety manual religiously, and seem to be able to pass examinations with good grades, fatal accidents still occur. Some of these accidents have been caused by violations of simple safety rules, which would indicate that the textbook type of program has, to some extent, failed. *Our men apparently learn the right answers to a lot of safety questions and problems, but when they meet these same problems under actual working conditions, they apparently do not recognize the hazard.*

Linemen and servicemen are accustomed to working with their hands, and from the time they start in as apprentices, they learn by watching the other fellow. They learn how to do the job by *watching*, yet an attempt has been made to teach them safety out of a book. Their whole background of learning, for years, has been based on what they see, and they do not take to book learning.

Officials of the company are much concerned about the facts brought out in a recent fatal accident, and now feel that past approach to the safety problem has been ineffective to some extent. These officials have requested that steps be taken immediately to change the approach, in order to improve safety records.

It has been recommended that the following specific plan be put into effect immediately on all electric properties:

1. We are to supplement our present safety program with a four-hour visual type of demonstration program to be held once a month, during which we can demonstrate some of the things we have been talking about for many months.

2. This meeting is to be held during the day on company time, and is to be attended by all servicemen, linemen, and anyone else working on lines, metering equipment or substations.

3. The demonstration meetings are to be in charge of a *visual demonstration director*, and we recommend that the superintendent of operations on each property, the property safety director, or someone who, in the opinion of the general manager, is capable of organizing and directing the program and the men putting on the demonstration, be appointed for this job.

4. Each electric property is to build immediately one or two spans of line at some convenient place that can be used for demonstration purposes in this visual program. This is not to be energized, and is to be used exclusively for practice purposes. The practice line should be so constructed that any combination of circuits now in existence may be installed for demonstration purposes. The following specific circuits, transformer stations, etc., should be provided for:

   a. Transmission or distribution 6.9 kv. and above.
   b. Distribution primary 2,400 volt or 2,400/4,160 wye.
   c. Series street lighting circuit, or
   d. Multiple street lighting circuit.
   e. Secondary circuit single or three-phase, three- or four-wire.
   f. Single-phase and delta transformer stations, all voltages and all types on local systems.
   g. Buckarm, skeleton and secondary rack corners.
   h. Guys.
   i. Services.
   j. Any other circuits, etc., that may exist on local system. Additional poles or equipment in addition to suggested practice spans may be needed.

5. This line is to be used to reenact fatal accidents that have occurred on all properties in this group, also accidents that occur in other companies whenever it is possible to learn the details of such accidents. Our employees will be taught how to recognize and to avoid the hazards encountered in the everyday jobs they do. The specific jobs will be set up as part of each program, and our men will do this work under the supervision of the *visual demonstration director*, the property safety director, and a committee composed of the safety meeting chairmen from each district. Each problem will be covered by actual demonstration on the practice line, and conclusions reached as to the safest method to be used in the future in handling this particular job.

The following are suggested specific problems or jobs that our men are called upon to do in their everyday work which can be used for demonstration purposes:

   a. Changing broken insulators on hot lines.
   b. Insulator changes above hot wires.
   c. Changing out transformers with risers hot.
   d. (Pulling in). Installing wires on hot circuits
   e. (Pulling out). Removing wires along or under hot circuits.
   f. Replacing broken switches.
   g. Setting poles (new construction).
   h. Replacing poles in hot lines.
   i. Removing wires from old poles that are rotted off below ground level.

*From a paper presented before the Rocky Mountain Electric League in Denver.

j. Replacing arrestors on hot circuits.
k. Transferring lines to new poles.
l Changing cross arms
m. Picking up fallen wires.
n. Demonstration of hot sticks.
o. Demonstration of pole-top resuscitation.
p. Demonstration of proper grounding of lines taken out of service for repair or maintenance work.
q. Demonstration of certain phases of construction, such as climbing clearances, working space and clearances, circuit separations, etc.
s. Demonstration of sending up material to linemen working on hot lines.
t. Use of truck, winch lines, etc.

Each of these particular operations offers its own particular hazard. If these hazards are properly demonstrated to our men, we believe the visual impression will be lasting.

6. Our present safety manual is to be used as a textbook, all safety rules are to be covered by actual demonstration, and our employees are to be shown the reason back of the rules. Lack of understanding of a reason back of a safety rule encourages the individual to disregard the rule as he thinks it unimportant.

7. During the actual demonstration, the demonstration director will explain the problem, and, as the demonstration progresses, he will explain the action of the men, giving reasons why that particular method of handling the job in question is the safe method.

8. During the demonstration meeting, the property safety director and the safety chairmen of each district are to act as umpires or referees and closely watch the action of the men on the pole carrying on the demonstration. When the demonstration on this particular problem is over, these referees will immediately report to the demonstration director any mistakes or infractions of safety rules observed or any suggestions they have to offer that might make that particular job safer. The demonstration director will pass along to the entire group the opinions of the referees and will then request that the balance of the employees watching the demonstration also make suggestions and criticisms. *Based on the opinion of the majority, the demonstration director will then set up the proper procedure that will be used in handling this particular job in the future.*

Teaching safety by visual methods. Audience makes notes and discusses each operation later. Majority opinion governs in revising or making new rules

9. It will also be the duty of the property safety director and the safety chairman from each district to contact all employees between meetings and obtain suggestions or problems to be used in the visual demonstration meeting program. It will be necessary for our property safety directors to study conditions on their own particular property in order that a demonstration type of program can be set up to suit their particular needs. The demonstration director, property safety director and district safety meeting chairmen should meet well in advance of the demonstration meeting dates, in order to get these meetings properly organized. One of the reasons why safety programs fail is because of the lack of proper planning. It might be well to have the line foremen attend these planning meetings. The success of our safety programs is in the hands of our foremen and, unless they are sold on what we are attempting to do, we cannot hope to get very far.

We believe that, if our men learn line work or service work by watching, then they should be able to learn how to do that job safely by the same method. Our new approach is going to be—to do less talking about *safety* and embark on a program of *demonstrating* the things we have been talking about.

DEFINITIONS—The Electric Department

Job classification you won't find in the book but whoever heard of theory fitting reality?

Joseph J. Brugler
San Bruno, Calif.

A LOT of people wonder at the purposes and personnel of the Electric Department. The nomenclature is bewildering and titles confusing. But then power companies can't run without titles and nomenclature—the more confusing the better. Take a look at some of them—titles first:

Superintendent This word is derived from the Latin "super" meaning over or above and "attendo" meaning to care for or attend. This is literally what the Superintendent does. He scoots around superintending this and that and is naturally always underfoot, or in one's hair. He generally is a very pleasant man and invariably smokes big black cigars, which he slides from side to side of his mouth at the same time carrying on an animated conversation. He is especially clever around power houses at pre-empting the operator's chair whenever the latter rises for any reason. Once installed there, the superintendent embarks upon long telephone conversations, sometimes using two or three phones at once.

Assistant Superintendent This term is self-explanatory. He (for unfortunately all of these officials are men, even despite the manpower shortage) simply assists the superintendent in superintending. Generally he can snatch a phone or whip into a vacant chair even faster than his superior. He always carries a notebook into which he is forever jotting data of some sort. For 20 years I've waited for one of those books to be mislaid to see if it contains any fine phone numbers. No luck.

Chief Operator This is an ordinary or garden variety of operator who has made good. He rides herd on the operators in general, arranges schedules, vacations, etc. He usually is a good story teller, otherwise he never would be chief. He writes an annual joking letter to the crew asking them to name their vacation preferences. The gang enters into the spirit of the game in a hopeful sort of way. Later they find that these were simply practice choices, since the dates they covet have already been reserved by old guys simply dripping with seniority.

Division Operator This is another operator who has made good. Actually there are several of them and they do their operating by proxy since they only issue the switching orders to the men in the substations and power houses. They in turn take orders from the load dispatcher. Life seems to be like that. To paraphrase an old saw, "big dogs have little dogs to pester and to bite them; big fleas have little fleas, and so on ad infinitum."

Load Dispatcher He is the high man on the totem pole as the boys say who have come back from the Aleutians. So far as the operators are concerned, he's like the division operator—just a voice on the telephone (but what a voice). For the most part he doesn't get around much. But he is the one man with his finger on the pulse of the system.

Operator This guy is the "sine qua non" or the which of which there are none whicher. Without him the wheels of industry would grind to a stop and the firmament itself no doubt would fall, or so he thinks. His duty is to run the substation or the power house (in steam plants *only* the electric end). He is invariably an alert and dynamic sort of person who continually paces back and forth in front of his switchboard, much as the captain of a ship paces the quarterdeck. Or does he sit and sit and sit.

Second Operator This guy is a sort of apprentice operator. His duties are to make coffee for the operator and to dust off the operator's chair before the latter sits down. Also he must take all meter readings—positively.

Trouble Shooter This is the man with the climbers (the "spurs that jingle, jangle, jingle"). He is sent out by the D.O. to rescue cats from pole tops and to remove kites from power lines. Also to tell distraught housewives that their curler or toaster won't work because a fuse is blown. They are fine lads who can tell great stories of adventures on stormy nights and of biting dogs and barking customers.

Foreman Here is a peculiar illustration of how popular usage of a mispelled word can make that spelling correct. According to unimpeachable authority the word originally was "fourman," indicating that a person with that title did four men's work. Despite the new spelling certain authorities hold that the foreman still works as hard as ever. Usually they are very practical-minded persons with great manual dexterity and deftness with tools.

Sub-Foreman This is a sort of apprentice foreman. He hopes to become foreman when the foreman becomes assistant superintendent when the assistant superintendent becomes superintendent when the superintendent becomes etc.

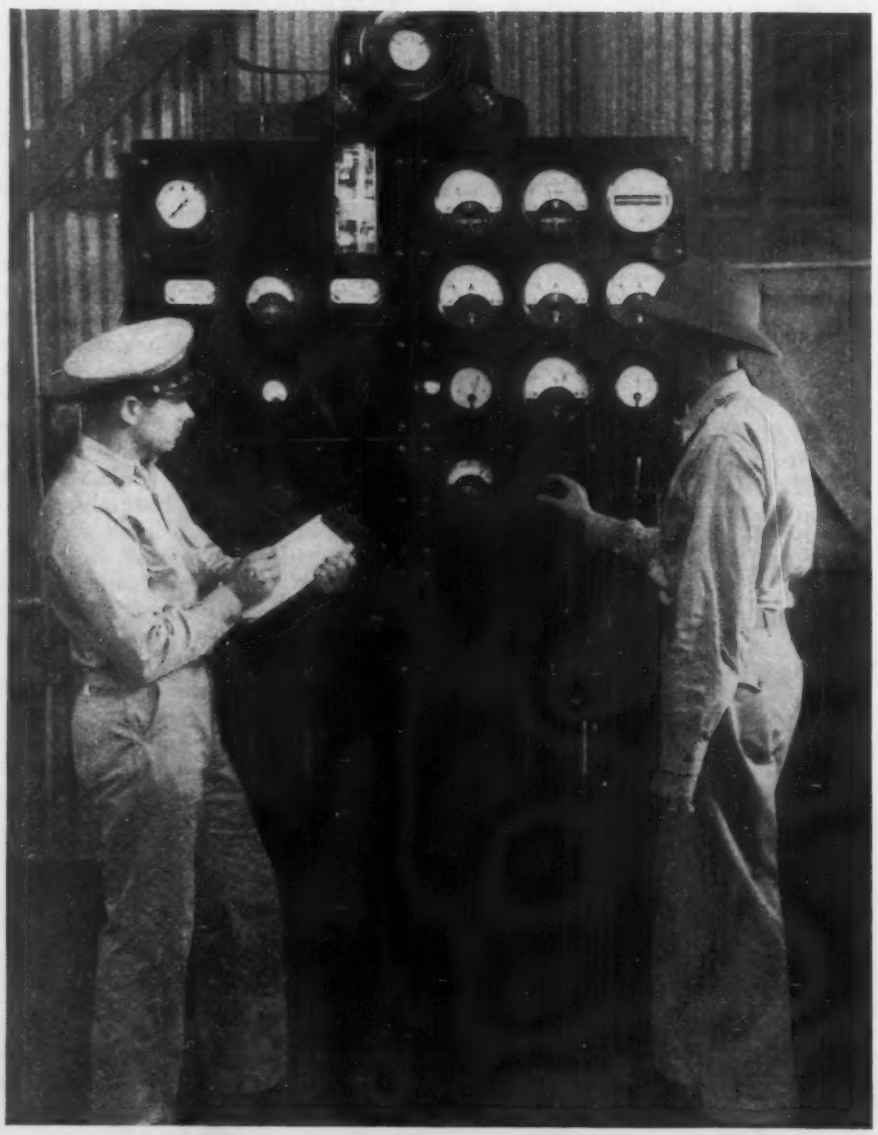
Maintenance Man He is the doughty character who keeps things clean and ship-shape around the plant. Usually they are the nicest fellows imaginable, a shield and buckler to the operator. In fact without them the plant would shut down whenever Old Man Trouble takes over.

Having thus classified personnel, it might be well to inquire into the technical aspects of their tools and duties. For instance a certain type of hand-operated disconnect switch is called a "leg switch." The opening of such switches is known as "pulling the legs" (and that doesn't mean yours). Should the operator in addlepated fashion pull the wrong leg, he is credited with "pulling a bloomer." Naturally this is frowned upon, as it is in all polite society. Incidentally rubber gloves are "de rigeur" in opening and closing these leg switches but not for sanitary reasons. They are usually charged with electricity and are known then to be "hot." The rubber gloves and switch sticks remove the bite.

Another item of equipment is the bus. The layman might take this as something to ride upon or even as a kiss. Such isn't the case, however. It is admitted that electricians are affectionate and some of them may like to ride on busses, but when they speak of a bus, they are not referring to back seat magic or to over-size automobiles. They mean a sort of heavy terminal electrical conductor.

Some time in the future we may attempt to answer the question "What is electricity?" or even to discuss the theory of magnetism.

Seabees Power Company Internationale



DOING the seemingly impossible and little to do it with is becoming a tradition with the famous Seabees in the war in the Pacific. Fishing a Jap generator out of the ocean and building a power plant with some miscellaneous parts from nine different countries is just one example of the work of this intrepid construction battalion of the Navy. They are a bunch of rough-and-ready Americans from all walks of life whose motto might well be, "It can't be done—but here it is."

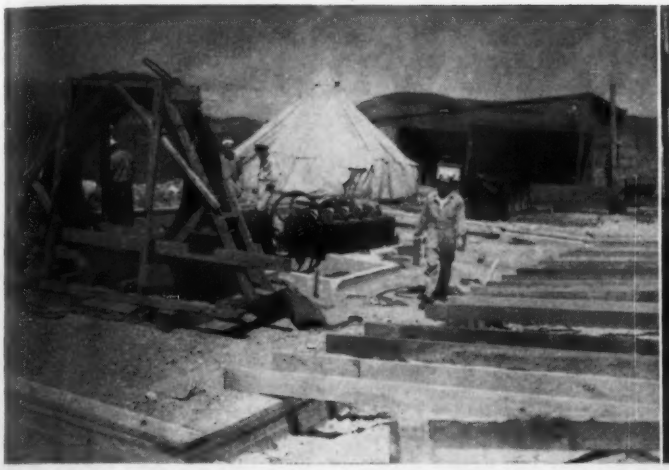
The Japs had left a 225-kva. diesel engine plant in an abandoned mine on one of the Pacific Islands, saying, "we'll be back in about two months." By the time the Seabees got there, everything removable had disappeared. In transporting the plant to the site of a new "central station" the barge was sunk and the generator had to be fished out of the ocean. A little rewinding and some drying out restored it to "as good as new."

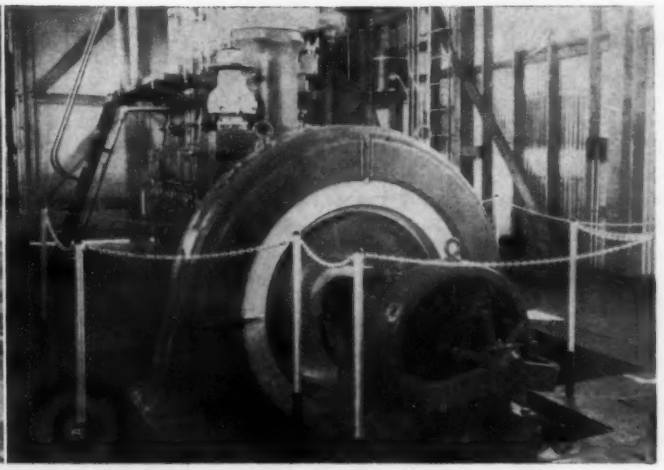
The Sulzer engine, built in Switzerland, was shy some important working

There weren't any Japanese school boys around to decipher the hieroglyphics on this contrivance (top left) so the Seabees used it for a diesel fuel tank

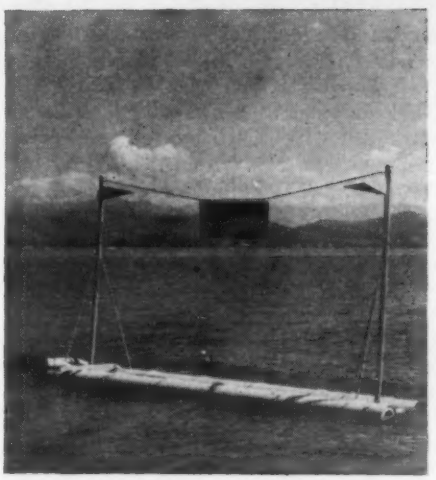
English name plate (top right) on Jap generator saved testing it out for rating when it was put to work by Seabees

A very creditable switchboard was made with Japanese and American instruments. Navigation lights from wrecked aircraft were used as indicating lights





Setting up power plant on New Caledonia (top left). Completed "all nations" plant (top right) contains equipment from nine countries, Switzerland, New Zealand, Germany, Denmark, Japan, France, U.S., Italy and Australia. Cooling water for the Diesel is circulated through 4-in. pipes lying on ocean floor. Pipes connect with floating receiver or heat exchanger (center)



parts, but scrap piles, storage yards and ingenuity made it "perk" again. When the plant was completed, it was a full-fledged "all-nations" Seabees job with trimmings. Transformers were of New Zealand, U. S., Japanese and French vintage. Forced feed oiler had been made in Germany and chain hoist in Denmark. The cable came from Italy; Australia supplied the cement and U. S. Seabees contributed the brains that made it work.

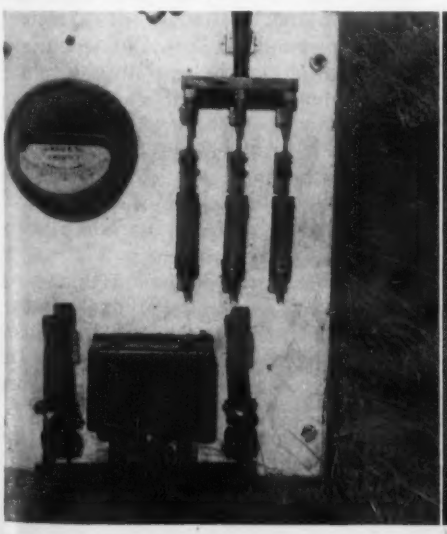
Thirty-ampere b a m b o o cartridge fuses for the 3,300-volt generator were made by enclosing 30-amp. fuse wire in bamboo tubes. The switchboard had disappeared and the few instruments available did not include an indicating wattmeter.

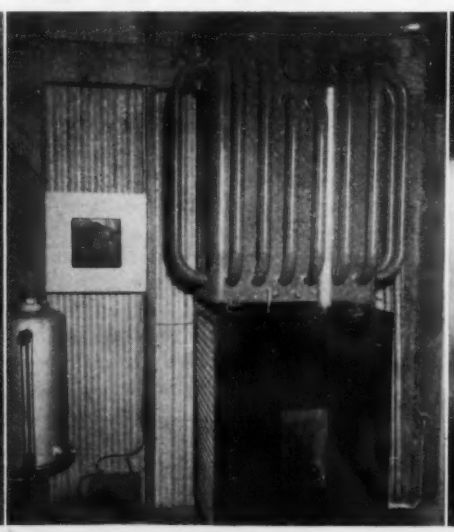
However, a small matter like this doesn't phase a Seabee. He merely takes two single-phase watt-hour meters, places the rotating discs on a common shaft, finds a hairspring from a wrecked wrist watch and attaches it to the shaft to oppose the rotating torque of the movable element, calibrates the "instrument," and he has a perfectly good indicating wattmeter.

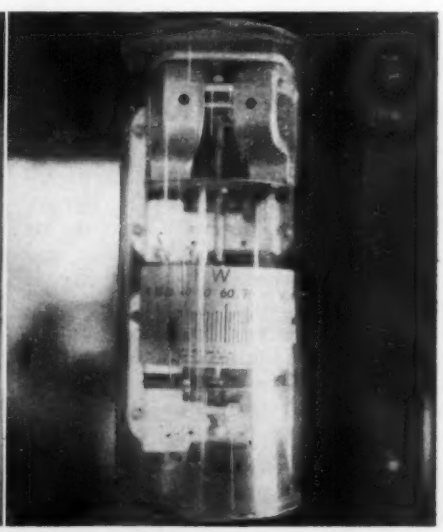
The cooling water problem was solved by carrying a 4-in. circulating line out on the ocean bottor to a 12-in. receiver tank, which acts as a heat exchanger. The lower temperature of the sea water provides sufficient cooling. A Caterpillar tractor engine-driven auxiliary generator is paralleled over the peak to provide total output of 270-kw. Except for a three-week shutdown for general overhaul, the plant has operated 24 hours a day for a 12-month period, with an outage time of only six hours and ten minutes.

The plant was built by the Third Naval Construction Battalion, under the supervision of Commander B. L. Phillips with the aid of Howard R. King and Raymond F. Westerfelhaus, chief electrician's mates.

Salvaged Japanese electrical equipment (lower left). Some is copied from American manufacturers, other pieces are crude in design and workmanship. Power transformers and low-voltage circuit breakers (center) are installed as a unit. Emergency lighting system consists of 6-volt automobile headlights. Three-phase indicating wattmeter (lower right) was made by Seabees from two salvaged Japanese single-phase watt-hour meter elements mounted on common shaft with hairspring from a wrist watch to oppose rotating torque







Why We've Outgrown No. 14

High voltages, frequencies are off the beam when No. 12 instead of 14 would be simple, practical, inexpensive means to home wiring adequacy

J. A. Hill
Chairman, Adequate Wiring Committee
Pacific Coast Electrical Assn.

BETWEEN Mr. Hibben and Mr. O'Dwyer it might be thought there was nothing left to be said about the elimination of No. 14 wire, pro or con. Mr. O'Dwyer just about reduced to the ridiculous all opposition to eliminating No. 14 by overselling his theories. (May 1944 issue, p. 62). Mr. Hibben in his usual gentlemanly way, so ably brought down to earth so many of Mr. O'Dwyer's ideas in his letter published last month (p. 68) that little need be said on that score. The theoretical advantages claimed for higher voltages and frequencies and three-phase for everything are intellectual utopias. It would cause so much expense and disruption to make such changes that they can hardly be taken seriously.

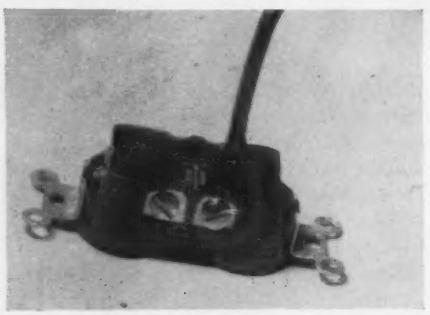
If we could start over again at the beginning, and know as much as we do now, it might be the thing to do to start with higher voltages and frequencies. Now there is too much to change, no matter how desirable it might be. The situation is like that of changing to the metric system. Nobody who knows the difference disputes the desirability of changing to the metric system, but the act of changing involves so much that the tremendousness of it and the cost of doing so run into billions of dollars. As a result it just isn't being done. A universal language is another such desirable thing, but we continue to have a babel of tongues because to change would involve too much re-education and life is too short.

When the Bureau of Power & Light in Los Angeles took over the Los Angeles Gas & Electric Co. system and changed its own distribution to 60 from 50 cycles, it cost the bureau $2,000,000 or more just to change its customers' motors, clocks, timing and control equipment, to say nothing of the cost of changing its own equipment. And it is said that the Southern California Edison Co., now contemplating a similar change to 60 cycles after the war, estimates it may cost some $7,000,000 to do so.

Rather a high price to save No. 14 wire it would prove, if we were to change to 100 or to 400 cycles. It is relatively much easier to change from No. 14 to No. 12 to get our added carrying capacity.

I certainly can feel for anyone who objects to twisting heavier No. 12 wire around the terminal screws of ordinary wiring devices. But one of the points that I made in my original report was that now such a difficulty had been removed. New wiring devices with simple pressure fittings (see illustration) eliminate the binding screw altogether. Several manufacturers already have them on the market.

The difference in materials cost to an electrical contractor in an average residence when No. 12 is used instead of No. 14 is only from $3 to $4 per house. But the time taken in making connections to old type wiring devices



New pressure connections in standard fittings have holes for wire insertion in back, a wire strip guide, and space for looped wire as heavy as a No. 10

with binding screws runs the cost of labor up as high as $12 to $18 per house, in addition to the extra materials cost.

Yet with these new pressure terminal devices not only is the nuisance objection removed but the cost objection is, too. A contractor using these new types can save enough on installation labor even to pay for the extra materials cost. This is the only way in which labor will be reduced in this proposal, but in the long run it will mean much more to the electricians than the time lost, for more wiring should easily be sold because of it. Samples of these devices were submitted recently to meetings of the union and the men all favored the improved devices because they hate so to twist heavy wire around binding screws. These devices will even take a No. 10 wire quickly and easily and without bending the heavy conductor.

Suppose a switch is made to three-phase for residences in order to carry more load on No. 14 wire. There would still be a large number of single-phase installations or we would be required to change them over to three phase. If there had to be both single-and three-phase distribution throughout the utility systems, it would mean duplication and certainly would not save copper. At best, there would be duplication for several years while the changeover was being made. That would mean that appliances for both 220 and 208 volts would have to be marketed and, as the changeover was made, likewise changed over for the customers. It would mean change of cords and wiring devices to provide grounding.

Even so the industry would have to accept the chance that the public itself would not like or want the three-phase idea. In other words, there is no guarantee that the public would stand for it.

Higher voltages introduce the question of safety on a bigger scale, aside from the considerations mentioned by Mr. Hibben. Safety is the concern of electrical inspectors and it is quite likely that they would surround the use of higher voltages with restrictions designed to provide adequate safety which in the end might make installation and equipment cost much more than it now does. Everything very likely would be required to be grounded by means of three-wire cords and special plugs. All of this would end in use of more copper than with low voltages.

Contrary to the statement that conduit is now used almost exclusively, this is not true in regard to house wiring except in a few localities. In fact, there is a difference of opinion as to whether it is desirable or not. Everyone knows that there is a limit to the amount which people will spend for a house wiring system and the more iron you put into it, the le-s

copper you get. Only copper carries electricity. So conduit protection for higher voltages is not to be taken for granted.

As to higher frequencies, it is true that lighter weight motors can be made, motors of much smaller size, and they are being made and used for special applications in aircraft. But it is open to question whether these are necessary or desirable for general use, certainly not in domestic appliances. Assume that such lightweight fractional horsepower motors, operating at 300 to 400 cycles, would turn at from 6,000 to 20,000 rpm., how would these speeds be adapted to washing machines, refrigerators, vacuum cleaners, furnace fans, mixers and the like? If an elaborate gear train were necessary, the efficiency would be reduced. There would be bearing trouble operating at such speeds. And noise would likewise be a serious matter.

If the objection to eliminating No. 14 wire is to be based on copper scarcity, I do not think we need to worry about it very much in this country. But if copper is scarce when the war is over, we will have great quantities of aluminum. Aluminum makes good conductors. With a surplus of aluminum plant capacity and power to make it, there will undoubtedly be a need for a market for aluminum and it may be cheap enough to take the place of copper.

Then if aluminum conductors are used, they will have to be larger anyway to accommodate the same capacity. We might as well get in the habit of using larger conductors.

So far all this has really been beside the point. It is diversionary from the real issue. Why bicker over little details when we have a genuine problem to solve and that is to increase the capacity of home wiring systems in the most practical, economical method?

The West will end the war with tremendous sources of electric power. The economic pressure of the investment in generating and distribution capacity will be so great that we can look to an unprecedented drive to increase electric usage. One of the major markets for such power use will be the home, which during the war has had its employment of electricity restricted. We are entering an electric era after the war. We will need more carrying capacity to make full use of this electricity in the home.

Of recent years houses have become more rambling, spread out more, which results in longer circuits. Add to this the trend in all heating appliances such as irons, roasters, toasters, etc., to be designed for higher wattages. Under such conditions we have to make one of two choices: 1. Larger conductors for multiple outlet circuits or 2. separate circuits for every outlet except perhaps the straight lighting circuit.

In this the economics of the situation should be considered. The separate circuit idea may be better engineering from a theoretical standpoint. But it means more panels, more circuit breakers or fuse centers, more service equipment of all kinds, all of which run the cost up. In beautiful brochures issued in the past, by prominent manufacturers to aid the promotion of adequate wiring as well as domestic electric equipment, the perfectly sound radial wiring idea is advocated. For a five-room house, however, it takes about 17 circuits to provide the adequacy which the booklets advocate.

When it is considered that the average house is now wired in four circuits, and a raise to even six circuits is quite an accomplishment, it is not very practical to assume that we can sell 17 circuits to a five-room house in the immediate future, except in rare cases. The use of larger conductors is a reasonable compromise. It is reasonable in cost as well as reasonable in its flexibility and current carrying capacity.

If fluorescent lighting is to become generally used in home lighting with present voltages and frequencies, the power factor angle makes it all the more important that larger copper be provided. This forecast of future lighting is the strongest argument for increasing domestic circuit wiring from No. 14 to No. 12 and often No. 10.

While at it, let me answer an objection to the general Pacific Coast Electrical Assn. proposal for the elimination of No. 14 wire in house wiring which has been raised by the electrical inspectors in some cases. They do not object to No. 12 wire, but there is doubt in their minds as to the advisability of fusing lighting circuits at 20 amp.

This proposed elimination of No. 14 wire is directed toward the provision of larger conductors and is not essentially concerned with fusing. The fusing at 20 amp., however, did come as a suggestion from electrical inspectors advising the PCEA code and ordinance committee in southern California. The matter of the proper fuse protection can be left very well to the inspectors. If they feel that 15-amp. fuses should be placed on lighting circuits of No. 12 wire, that is all right. At least if the public then removes such fuses and puts in 20 amp. or 30 amp. fuses, the wire itself is of sufficient size that this overfusing will not endanger it.

In the experience of our company, from service calls of our field service men, we have not found overfusing on 20-amp. circuits to be prevalent. The 20-amp. circuit seems to be ample to hold most appliance loads around a home. But on No. 14 circuits, fused originally at 15 amp., we have found 85% of them overfused either at 20 or 30 amp.

Whatever criticisms there are of the idea to eliminate No. 14 wire from residential wiring have sprung from well intentioned people who have found fault with minor details and lost sight of the main objective. Wiring with any size wire at all is a compromise of a number of theoretically better considerations. What this movement seeks to do is to lift the compromise up a wire size to gain more carrying capacity in the most practical, easy, uncomplicated and economical manner. All the other ways in which it could be accomplished would be more costly, more complicated, require more education and would take longer to achieve, if ever.

Why trip ourselves up over needless complexities? There is a job to be done, millions of kilowatts to be employed. Why not do as the Seabees, blaze a bigger road for electricity straight across all the jungles of petty details in the quickest possible time?

● SURPLUS MATERIALS are being placed on the market by government agencies through special facilities set up for the purpose. An effort is being made to get the participation of the regular channels of trade in the disposal of this material. Used electrical equipment dealers who have facilities to rebuild or recondition and the storage space available to store, were one such group that has been consulted in regard to surplus stock. In general, the surplus commodities owned by the government may be sold by the government agency at a ceiling price not exceeding cost of acquisition. Agencies set up to dispose of material are the Treasury Department Procurement Division for consumer goods; Reconstruction Finance Corporation capital and producer goods; U. S. Maritime Commission, maritime property; Navy Department combat ship and naval auxiliary; War Food Administration, all surplus foods; National Housing Agency, surplus housing property; Federal Works Agency, surplus war property; Foreign Economic Administration, property outside the Continental United States.

● A RESEARCH PROJECT to study dielectric heating methods of heating plastics which are to be molded has been initiated at Illinois Institute of Technology by the Chicago Molded Products Co. Two fellowships were awarded to research assistants in electrical engineering and chemistry.

Inspectors Think Out Postwar Answers

Faced with a multitude of adjustments and difficulties made by wartime expedients, they suggest approaches to each basic problem

INSPECTORS of the Southwestern Section, posing a long and penetrating list of pertinent and impertinent questions at their last annual meeting, have come up with answers to the basic issues of the quiz for the guidance of their fellow inspectors. It all started when one of the editors of ELECTRICAL WEST was appointed to a national postwar planning committee for the International Association of Electrical Inspectors and was asked to present a talk on the subject before last year's meeting in Los Angeles.

That talk, *An Introduction to Postwar planning for the Electrical Inspector* (published in full in the 1943 proceedings of all the IAEI Section annual meetings, p. 115), sought to place before the inspectors a summary of the multitude of problems facing them and to stimulate thought and planning to anticipate these difficulties and be prepared for them.

The challenge was accepted by the Southern California Chapter, which appointed a committee headed by W. J. Tretheway, Huntington Park, and having as members city inspectors M. G. Riddle, Pomona; O. D. Butterfield, Torrance; A. C. Veit, Los Angeles County; H. V. Dobson, Santa Barbara, and Earl Malmgreen, Alhambra.

Answers are grouped into ten basic questions propounded with many variations by W. A. Cyr, associate editor, ELECTRICAL WEST in his talk. These answers, representing the thoughts and recommendations of practical inspectors on these questions, are as follows:

1 *Wiring systems, new and old.* Shall the Code decide? Yes. Code rule of the future will control as it has in the past. We cannot see where any wiring system now permitted by the Code will be entirely eliminated. We believe some should be limited to specific use only.

2 *Duration jobs. Can they be removed?* At the beginning of the war the industry was called upon to meet an emergency. Out of this grew the urgent need for substitutes—substandard installations, duration jobs. There is some consolation in knowing the inspector was in on most of this work. He required these jobs be made safe and adequate otherwise he would not have accepted them for any use. If they were good enough then, have been good through the duration up to now, then we believe them to be good enough for the life of need. Protected installations-concealed jobs cannot be disturbed regardless of methods or system used. Open wiring, most of which is very temporary indeed, can be, and possibly will be replaced soon by standard work. Reinspection will afford the inspector the opportunity for corrections on those that live too long.

3 *What will be done with huge stocks of materials thrown on the market after the war?* We can only see "stocks of materials" as approved merchandise. If it is not, we cannot accept it no matter where it came from, how it got on the market or in what volume; our job as inspectors is the same. To aid and assist in this effort we heartily recommend a sales control ordinance be adopted immediately by every community not having already done so. For used and secondhand materials, we can further fortify our communities by amending local ordinances to include to read: "no secondhand or used materials can be installed until approved by the local inspection department."

4 *New materials. Will usual Code procedure be sufficient to handle this?* Yes. However we recommend ways and means be provided to prevent new products being manufactured, sold and delivered to the trade in advance of approval issued.

5 *New appliances and devices. How controlled?* The sales control ordinance is the answer to this. To those communities who do not have such an ordinance, we urgently recommend immediate action be directed along that line.

6 *Electronics. Will education be necessary for the inspector to cope with this?* Yes, electronics is becoming more and more prominent under the jurisdiction of the electrical inspector. It behooves the inspector, therefore, to avail himself of every opportunity to know electronics, at least sufficiently to permit intelligent performance in line of duty.

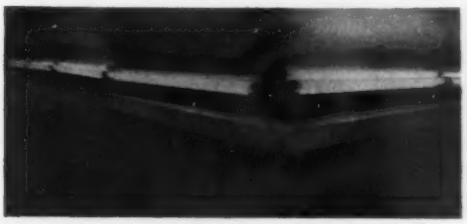
7 *Higher voltage for interior wiring systems. Do you advocate?* No—except for very few occupancies. There will always be children and fools. Let's not make it any easier for accidents to happen. How can we teach the safe use of electricity on the one hand and build up electrical hazards on the other? The idea is too remote and impracticable to deserve further comment.

8 *Prefabricated houses. Wiring rules and regulations.* Wire raceways should be installed in all such type buildings at the time of original fabrication, regardless of the system or method of construction used; these raceways to reach every outlet in the building, and to the service entrance equipment; they to be provided with means for cross connection between or partitions, either in the attic space or space under the floor when the building is erected. There is to be no wiring installed at the factory, no wiring to be pulled in until such a building has been completely assembled at its permanent location and then only after a permit has been issued by the local inspection department having jurisdiction.

9 *Education for public safety. Safe use of electricity.* As always the inspector is all-out for educating the public in the safe use of electricity. He recommends more agencies through which this work could be broadcast and carried on.

10 *Bare neutral. Will the inspector disapprove?* Yes, we believe the inspector will disapprove until such time as there is sufficient experience through research furnished him to substantiate the idea.

Thus the point of attack upon each of these postwar questions at least is clarified and, since the task is individualized in each city or community, the manner in which each inspector may wish to tackle these adjustments is largely up to him. His fellows have thought through the policy.



Cove detail

Art Gallery

The Need

For the art gallery, adequate illumination on sidewalls where pictures were hung, without glare or specular reflection.

For the store in general, adequate general illumination to show off merchandise to best advantage and provide seeing for details of forms and printed material.

Installed

Cove lighting by parallel rows of two 40-watt fluorescent lamps. In the center, a glass shielded unit, 8 ft. long, containing four 40-watt lamps.

Results

Intensity on display pictures from 30 to 35 foot-candles.

Who

Kendrick Bellamy Stationery Co., Denver, Colo. Engineered and sold by Joseph Wright, Public Service Co. of Colorado. Fixtures manufactured and installed by Schockett Electric Co., Denver.

LIGHT FOR A STATIONERY STORE

fluorescent

Main Floor

In each of two bays, a 60 ft. continuous row, double unit, each containing 12 100-watt F. lamps in glass shields. Between pillars similar units, 10 ft. long containing four 100-watt F. lamps.

Average intensity at counters, 35 f-c.

Basement

Three continuous rows of double units, glass enclosed, 40 ft. long, containing 20 40-watt F. lamps; one double row of the same type units, 28 ft. long. Lower wattage used because of lower ceilings. Average intensity in basement, 40 f-c.

EMEA *Dope Sheet*

Care of Electric Portable Tools

PORTABLE electric tools, though small in comparison with other machines in the plant, perform a service to industry and maintenance alike that makes them practically indispensable. They are built with the same degree of accuracy as the finest machine tool, but are frequently subject to abuse and neglect that could be avoided by a little bit of precaution on the job.

Portable electric tools should be kept in top operating condition. Frequent inspection and careful attention to first signs of wear or trouble will often save costly repair bills later.

Suggestions for Use and Operation of Portable Electric Tools

1. Before putting into use, always check the name-plate of the tool for motor specifications and see that they agree with the voltage, phase, cycles etc. of your supply line. Voltage should not vary more than 10% over or under that specified. Universal motors are widely used for powering portable electric tools and will operate either on d-c or on a-c of 25 to 60 cycles.

2. Always ground electric tools while in use. Where possible use permanently grounded wiring systems with three-wire receptacles and plugs (four wire for three-phase systems.) This will avoid the unsafe practice of using the tool without connecting the ground wire.

3. Lubricate properly as often as required. Follow manufacturers instructions for proper lubrication. Avoid excess grease in gear cases.

4. Keep electric cable as clear and safe as possible from harm. Keep it away from oils and greases which will ruin the rubber. Where long cables are necessary, use wire large enough to avoid too great a voltage drop.

5. Avoid overloading the tool. Do not use dull tools. Drill bits, saws etc., when kept sharp and in proper condition, will do the job more efficiently.

Maintenance Suggestions

Keeping a maintenance record such as a simple card file, for each tool in the plant will help to insure a systematic inspection schedule. The maintenance man should perform the following operations whenever a tool is inspected:

1. Clean out all accumulation of metallic dust, chips and dirt from in and around motor, brushes and brush holders.
2. Thoroughly clean ventilating holes and slots.
3. Clean or smooth commutator with sandpaper.
4. Replace worn brushes if necessary.
5. Check brush spring tension and see that springs are properly seated.
6. Tighten lead connections to brushes and brush holders.
7. Clean and inspect switch and tighten all connections.
8. Inspect cable for breaks and repair or replace if necessary.
9. See that attachment plug is in good condition.
10. Clean all accumulation of chips and metallic dust from chuck with gasoline or other suitable cleaning material. Immersion in oil for a few minutes will usually loosen tight jaws.
11. Inspect grease in gear case. Wash all worn-out grease from the case with suitable cleaning material.
12. Relubricate with lubricant recommended by the manufacturer. Avoid excessive amount of grease in the gear case; approximately one-third full is usually sufficient.
13. Tighten all screws.

When a tool fails to operate, check for the following:

1. Brushes not making contact
2. Broken motor lead
3. Broken cable
4. Switch not making contact
5. Open circuit in armature
6. Open circuit in field coils.

When a major repair is necessary and the maintenance man is not properly equipped to take care of it, the tool should be sent to the nearest factory service branch of the manufacturer.

—EMEA of Southern California.

● GRAPHICAL SYMBOLS for electrical and electronic equipment, in conflict because of the divergent uses of symbols by the power industry and the communications industry have been brought together in a newly developed American war standard coordination of graphical symbols just completed by the American Standards Assn. at the behest of the armed forces. Because the power industry and communications industry each developed its own group of symbols, the divergence became more important with the extensive use of the electronic devices in war communication control and detecting. The armed forces, faced with the effort of training large numbers of new personnel, found the lack of uniformity in drawings a constant source of trouble. With the completion of this war standard, arrangements are being made to revise the graphical symbols for telephone, telegraph, and radio use and the graphical symbols for power and control equipment previously approved by the American Standards Assn. Copies may be obtained from the American Standards Assn., 29 West 39th Street, New York City 8, New York.

● A REVISED American standard for industrial control apparatus in the heating, generating, and general machinery fields, is being brought out by the American Standards Assn. It correlates information contained in the AIEE Standard No. 15 and the NEMA Industrial Control Standard published in 1937.

● COPPER WIRE production is limited by lack of manpower, scarcity of cotton and asbestos yarn and the necessity of working with new and yet unproved insulating materials, the copper division of WPB warned recently. Refined copper production fell off during the first quarter and copper scrap is insufficient to meet demands for military and essential civilian products.

O. L. Dupy, recording supervisor of M-G-M Studios, gave an illustrated talk on the reproduction of sound as used in the motion picture field at the regular monthly dinner of the Electrical Maintenance Engineers Assn. of Southern California, July 19 in Los Angeles. Pieces of equipment necessary for the reproduction of sound were shown by means of slides. He also showed testing instruments used in proper maintenance of this equipment. One of the outstanding sound recording engineers in the moving picture industry, Dupy brought forth many interesting details of the electrical operations. The question of incorporating the organization and making certain revisions to its constitution was placed before the membership at the last meeting also.—Henry Bush, editorial committee.

New Horizons for Northwest Dealers

To explore the future together, dealers and contractors met in their home towns with the Northwest Electric Light & Power Assn.

A GLIMPSE into the future possibilities for promoting the sale of electrical appliances in the Pacific Northwest, when appliances again become available for civilian use, was carried to 387 electrical dealers and contractors in 79 towns in Washington, Idaho and Oregon in June, by the Northwest Electric Light & Power Assn. Ten meetings were held in the territory served by Puget Sound Power & Light Co., The Washington Water Power Co. and Pacific Power & Light Co., each company acting as host for the meetings in its territory. The schedule of the meetings and total attendance is shown below.

Company, Place and Date	Total Attendance
Puget Sound Power & Light Co.	
Mt. Vernon, Wash., June 5	103
Seattle, Wash., June 6	198
Olympia, Wash., June 7	95
Wenatchee, Wash., June 8	54
The Washington Water Power Co.	
Omak, Wash., June 9	80
Spokane, Wash., June 12	129
Lewiston, Ida., June 13	72
Pacific Power & Light Co.	
Walla Walla, Wash., June 14	75
The Dalles, Ore., June 15	77
Yakima, Wash., June 16	95
Total	978

The meetings all followed the same pattern, being dinner meetings with an after dinner program lasting about, but not over, two hours. Beside dealers and contractors, there were present at each meeting representatives of manufacturers and wholesalers in the territory, local utility people, city officials, editors, radio station operators and others. A summary of the registered attendance at the ten meetings is as follows:

Washington, Idaho, Oregon June 5-16, 1944	
Dealers and contractor representatives	387
Separate firms represented	346
Located in (cities and towns)	79
Manufacturer and wholesaler representatives	114
Local utility representatives	135
City officials, editors, radio and miscellaneous	39

At each meeting, the division manager of the local utility company was asked to take a prominent part as host of the evening, and participate with a local official in welcoming the guests. In the Washington Water Power Co. territory, the division manager acted as chairman of the evening: C. Rea Moore at Omak; Lewis A. Lewis at Spokane; G. R. Beckman at Lewiston. C. E. Hess, general sales manager, Puget Sound Power & Light Co., chairmanned the four meetings in his company territory and this function was performed by D. B. Leonard, commercial manager, Pacific Power & Light Co., in his three meetings.

The program at each meeting was the same except for those presenting the different subjects. After the welcome, the chairman introduced the first subject: *Postwar Plans of Manufacturer and Distributors.* Presenting this subject in different localities were, D. B. Leonard, Guy E. Davis, Pacific Power & Light Co., and C. E. Hess. To illustrate the talk, there were displayed boards on which were mounted an assortment of booklets, pamphlets and advertising on postwar plans by various manufacturers.

There followed a showing and demonstration of new lighting sources by Berkeley Snow, executive secretary of the association. Snow appeared four times on the program with a different demonstration interspersed between the five talks. These demonstrations were put on in a non-technical manner and, for the most part, in lighter vein, so that they supplied relaxation and some comic relief to a program otherwise a little heavy with serious talks. Snow showed successively in his other appearances, the Westinghouse Precipitron, DuPont silver-base paint used as a heating element, and black light.

The adequate wiring story was next presented by Arthur E. Schanuel, of the National Adequate Wiring Bureau. This talk was delivered with the aid of charts and pictures in the bureau vizualizer.

Utility plans for after-the-war promotion was the next subject, and this was handled by the general sales manager of each of the utility companies in his respective territory; C. E. Hess for the Puget Sound Territory; R. B. McElroy, general sales manager of the Washington Water Power Co.; and D. B. Leonard for Pacific Power & Light Co. Each of these stories was different, since each portrayed a specific company's plans and policies in so far as these plans had been worked out at the time.

Next item was a talk titled, *The Association for a United Industry Front,* given by R. B. McElroy at part of the meetings and C. E. Hess at the others.

The program was brought to a close at all the meetings by an inspirational talk by Dr. G. W. Allison, Puget Sound Power & Light Co., titled, *When the Shooting is Over.* Dr. Allison gauged the length of his talk by the amount of time left between when he was introduced and 9:30 p.m., so that in every instance the meetings closed promptly at 9:30.

Dealer and manufacturer guests were asked to register and to check on the back of the registration cards the names of appliance and wiring manufacturers, in whose products they were particularly interested. From this check these manufacturers were notified and asked to send to these interested dealers and contractors all their postwar planning booklets, advertising and other literature.

The meetings were considered highly successful, in that they were quite generally enthusiastically received. In most cases these dealers had not attended electrical meetings for many months. By listening to this program and looking a little into the future,

Northwest Electric Light & Power Assn. Regional Contractor-Dealer Meetings

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D. B. Leonard, speaking, and C. E. Hess

their thoughts were focused once again on the possibilities of getting back into the electrical business when appliances again became available. The program was found to be well rounded out, inasmuch as all the talks were brief and to the point, with all speakers adhering closely to their written texts and with the demonstrations furnishing diversion.

The subject matter presented at the meetings is published in the following pages, using briefed editions of the written texts and summaries of the talks by Schanuel and Snow.

These meetings were first suggested at a meeting of the association executive committee in Butte in September 1943, as a means of unifying the electrical industry in the Pacific Northwest for postwar promotion. The idea was turned over to the subsequently formed electrical development committee to work out. Under the chairmanship of C. Patrick Johnson, Puget Sound Power & Light Co., this committee held meetings of interested persons to explore the possibilities of organizing an experimental series of meetings. The job of working out the details was turned over to the Utilization Section under C. E. Hess, chairman, and a special sub-committee of the electrical development committee, including D. B. Leonard, chairman of the Utilization Section's planning committee, Ross B. McElroy, chairman of the section's membership committee, L. R. Wilson, lamp department of General Electric Co., and H. A. Dunlap, Westinghouse Supply Co., the last two representing the manufacturers and jobbers respectively on the electrical development committee.

Fine cooperation was received from many manufacturer and jobber representatives in the territory, both in preparing material and lending equipment for the program, and in helping with dealer and contractor attendance.

Manufacturers', Distributors' Plans

Highlights of several of many worthwhile ideas which dealers can use now to prepare the way

Presented by D. B. Leonard, Guy E. Davis, C. E. Hess

WE are dedicating this series of meetings to a postwar program which will provide employment for our returning soldiers and will again make material contributions to better living, for the 130 million individuals residing in the United States.

American industries through their research departments have developed improvements and scientific devices which have made our mechanized war equipment generally more modern and effective than that used by other nations. We have only to cite the development and use of radar as a typical example, or the stabilizer used to hold tank guns on the target despite the rolling terrain over which the tank is moving. Other developments include jet propulsion and innumerable other things which military secrecy prevents us from discussing now.

What are the plans of our research engineers for new electrical devices to be built after the war? What are the most recent developments in the research divisions, and what is the thinking of industrial management in the sale of these electrical devices in the postwar period?

Quite commonly mentioned now is the new automatic washing machine which was introduced prior to the war but which had not been widely accepted and sold. Now with many improvements as a result of additional research, any number of manufacturers are planning to unveil new automatic clothes washers which it is anticipated the public will accept with enthusiasm.

We will see improvements in fluorescent lighting including the new thin tube and circular ring fluorescent lamps. To this list of items will be added the bactericidal lamp for reducing bacteria, infrared applications, extensive use of ultra violet and on into the field of electronics. Here, television, frequency modulation radio reception and other developments in this field will offer new joys and entertainment for every wired home in the nation.

The Precipitron or electrostatic air cleaner is an item which probably will be prominent in the list of postwar appliances.

Much interest has also been expressed in the probable market for low-temperature refrigerators in residences, as many people have experienced the advantages of quantity purchases of frozen food through the use of lockers, and this system appears to have public acceptance.

In the field of refrigeration, the accomplishments are but little short of miraculous, for war has accelerated improvements far beyond the normal development of a peace economy.

With these and innumerable other new things in mind, we look optimistically to the postwar period as a time when opportunity will knock at the door of every electrical dealer in the area. He has merely to heed the sound, make the plans now, and take advantage of the new developments and ideas, so he will be ready when electric appliances are again available for his sales floors.

To every dealer here tonight and to everyone interested in selling appliances, let me urge you immediately to communicate with your jobber or distributor to determine what may be available in the way of suggestions, and also to impart to him the fact that you are interested in establishing a working relationship as an outlet for the sale of his particular appliance or device.

Many manufacturers have published booklets and some of these will be referred to briefly as examples of what are available from these sources. You may be interested in planning a store to merchandise electric appliances and if so, a series of booklets by Hotpoint on *Planned Electrical Merchandising* may be of interest to you. They discuss store location, store arrangement, methods of displaying merchandise and other matters of value to electrical dealers. If you want them, check your registration card on the back opposite Hotpoint and your name will be placed on the list to receive them.

If you are assembling ideas in a file convenient for future use you will be pleased to have the *Post War Planning Guide for Appliance Retailers* which has been made available by Kelvinator. This is a very useful folder in which ideas may be filed for future use. If you want one of these, check your registration card on the back and your name will be sent to request this material. The exhibit includes Frigidaire material and some of you may wish to have your name placed on their general mailing list. The same will be true of the General Electric

Co., Norge or of Landers, Frary & Clark with its Universal line, producers of the "U Plan for 'V' Day."

Among the manufacturers who have prepared valuable outlines is the Westinghouse Electric & Mfg. Co., with its *Electrical Living in 194X*. This is really a textbook because they have spared no cost in developing a complete and attractive manual. Arrangements have been completed to secure copies of this booklet, too, for dealers who have indicated their desire to have one by checking the registration card opposite the Westinghouse company's name.

Later in this program you will hear an interesting story from a representative of the Adequate Wiring Bureau. You have a treat coming in the talk by Mr. Schanuel, but you will also likely wish to have the wiring booklets which are available from the Anaconda Wire & Cable Co. Be sure to check that item on your registration card and read the material carefully when it comes.

Nearly every manufacturer is planning new up-to-date sales training helps. If your name is on his list, your manufacturer will send them to you. New selling methods will be as interesting as the new appliances.

Time does not permit discussing in detail all of the plans which are available nor does the exhibit which we have assembled here include all of the manufacturers who have provided postwar outlines. These are simply representative and are samples which have come to our attention. If you think specifically of some other manufacturers whose material you would like to have, just write their name on the card and we shall attempt to secure that material for you as well.

The necessity for planning now to return to a peacetime economy after victory cannot be overemphasized. It is not now too early. Let's work together in the electrical industries to lay a sound foundation to enable everybody really to live electrically after the war.

Wiring Jobs In Postwar Home Building

Materials will be available before appliances to start construction of adequately wired homes

Arthur E. Schanuel

THE wiring job in the postwar home will be a major consideration. The wiring contractor, as one of the sub-contractors on the job, must think of himself as an important member of the building industry. The general contractor, or builder, must understand that an adequate wiring job will help sell his home. Let us look at this subject from the viewpoint of the builder.

One of the first questions he will ask is, "How soon will electrical construction materials be available for civilian building?" Wartime production of electric wiring construction materials has required practically no conversion of manufacturing processes and very little change in the type of materials used in peacetime. Production and distribution of these materials, now going into military channels, should move without delay into the home building operation, immediately the "go" signal is given for civilian construction.

Will the first wave of new home buyers demand postwar "dream" homes?

Never in the history of home building has the great mass of the general public been subjected to such a barrage of publicity, advertising and promotion of visionary ideas about the new home. The home builder will have a job reconciling the home buyers' demands with what the market has to offer. Builders are acutely aware of this situation that is being created and are seriously concerned.

Will sub-contractors have the "know-how" to do the postwar job for the first wave of new home building?

The builder is dependent upon the "know-how" of some 14 sub-contractors and ten suppliers. What the market will have to offer to the postwar home buyer can only be the sum of what the sub-contractors can produce for the builder.

What new "know-how" will be required for the electrical job in the postwar home building?

The wiring contractor must sell the building fraternity on the idea that the wiring job will be a major consideration in the minds of postwar home buyers and that he has the "know-how" to make provision for the buyers' demands.

These buyers will want a full complement of operating equipment — kitchen equipment, laundry equipment, heating, ventilating and general household equipment. But it has been found by a survey of manufacturers that it will take from six to 18 months to get into full production of these appliances when the go-ahead signal is given. On the other hand, the building industry will be ready on V-day to move into home construction. How, then, can they meet the demands of the first wave of new home buyers for these electrical features and their operating equipment.

Adequate wiring is the electric key to postwar home building. With adequate wiring installed, the home buyer has full assurance that the home is

G. L. McDonald, PSP & L utilization manager, Bremerton, tells one to the head table. Listening left to right: Frank Walsh, PSP & L Seattle division manager, George Boyd, Westinghouse Lamp, Seattle; Arthur E. Schanuel, Adequate Wiring Bureau, New York, C. E. Hess, PSP & L general sales manager, Dr. G. W. Allison, PSP & L; D. B. Leonard, PP & L commercial manager; Ross B. McElroy, WWP Co. general sales manager; Paul J. Marble PSP & L

planned and built for postwar electrical operation.

But how can the prospect be shown that the home is adequately wired? Actually what does the public really know about adequate wiring?

Wartime housekeeping problems have put adequate wiring first on the want list of postwar home buyers. The electric service man is now in the military service and home owners have been taught to take care of some of their own electric service that they formerly requested from the service man. They have been shown through lectures and pamphlets how to take care of their electrical home maintenance —about fuses and circuit breakers, the number of circuits in the home, and how there should be a heavy-duty circuit for kitchen and breakfast nook and another for the laundry.

The answer to the question, then, "How can the prospect be shown that the home is adequately wired?", is to point out an ample size service entrance box with three service wires coming in from the power company's pole. Show plenty of branch circuits with their fuses and circuit breakers. The home owner has been taught during the war the importance of not having too long a run from the meter to the heating element and from the meter to the motor equipment. Show the prospect the branch service blocks on long runs. The building fraternity must be in the position to speak with authority about these "ABC's" of the electric wiring system, if prospects are to be satisfied that their postwar homes are adequately wired.

It will not be enough to say that the house has 47 outlets or 65 outlets. The home buyer must be shown that these outlets are conveniently located for using floor lamps and other electrical equipment. And show the prospect that he has full power from the meter to the motor, full speed from the meter to the heater; that this means low-cost operation, better lighting, full convenience and better value.

Builders are learning, too, that adequately wired homes are worth more for a mortgage loan than the difference in cost between adequate and inadequate wiring; that mortgagees loaning money on a home for up to 20 years maturity want the security for this mortgage to be a home that will not become obsolete in the minds of the owners within a few years. This point is very important to the home-builder who expects to finance his operations with long-term mortgages.

Then finally, use the poster, "Wired according to the standards approved by the National Adequate Wiring Bureau," which draws attention to the wiring in the home and emphasizes its importance to the home buyer.

Utility Promotion Plans and Programs

Each tells dealers the merchandising policies applicable to its particular territory served

Puget Sound Power & Light

C. E. Hess

(Delivered in Mt. Vernon, Seattle, Olympia and Wenatchee)

WE read and hear so much about the great strides that have been made during the war, both in design and operation of equipment, that practically all of us, I believe, are expecting not only radically changed electrical home equipment but also radically changed methods of doing things when peace is once more here. Both of these beliefs are fallacious. New equipment is going to be practically the same as that of 1942 and, with minor changes, our methods of doing business are going to be the same as they were then. I wish I could say that our dealer program is based upon some new and revolutionary thinking, but it isn't. Our plans for cooperating with you are going to be practically the same as they were when merchandise and wiring materials disappeared from the market. The only changes will be those that apply to the times we are now able to foretell. The best way to explain this statement is to give you now a brief outline of our present plans, with the caution that any program, announced at this time, may be subject to radical changes before the time it can be put into actual operation by the company.

Housing conditions are fast becoming a problem; many houses now occupied will be in an uninhabitable condition when this war reaches its conclusion, so I think we are safe in assuming that there will be much residential building. Based on this thinking, this company, through its dealer organization, is going to spend considerable effort upon the job of bringing the wiring contractor, the electrical dealer and the architect closer together. One method to accomplish this will be to encourage the forming of dealer organizations in all major towns. This company is going to furnish an electrical home manual to architects, dealers and wiring contractors which may be used to provide ideas for their clients or customers. This booklet will feature the arrangement and appearance of completely electrified homes and kitchens. The company will tie major advertising materials to low cost of operation of electrical equipment. Dealers will be furnished with well constructed permanent counter type "cost of operation" dials or wheels. We will have displayed in our offices the names of all dealers and wiring contractors in the community. Subject to the local conditions, dealers' merchandise will be displayed on company floors in the various offices.

We plan on promoting an electric appliance show each year in the major cities. We will advertise in local papers featuring electrical merchandise and adequate wiring. If at all possible our promotional programs will be set up six months in advance and these programs will tie in with national advertising programs. Radio advertising will be used and the company will make radio copy available for dealer use in the territory.

Our representatives will coordinate activities of all phases of the building industry. By that I mean we will attempt to make the plumber, the cabinet maker, the painter and the floor covering people all familiar with and conscious of the need of electrical equipment in the home in order to make it complete. Each community will be encouraged to feature a model home each year as one means of coordinating the efforts of all concerned.

The electrical dealer will be offered the services of our home service consultants for the purpose of following up the use of electrical equipment in the customer's home. Floor demonstration service, particularly of seasonal appliances or accepted new appliances will be offered the dealer. Our home service consultants will be available to individual dealers for promotional activities; in this way they will be of assistance to you in your promotional efforts. You may refer your customers to the company's home service consultants for information regarding the operation of their electrical appliances.

We plan on setting up a separate home lighting section. This section will provide educational programs for you and your employees. We will conduct store demonstrations on home lighting in your stores. The home lighting consultants will call on homes in connection with continuous light conditioning programs. They will furnish advisory service to customers

relating to the availability of recommended lighting equipment.

Our present plans call for assistance to dealers and dealer sales people by furnishing them with information on wiring, plumbing, cooking and the advantages of electrical equipment. Our dealer sales development consultants will, where desired, carry on salesmanship classes for dealer groups. We plan on having movie picture equipment available for use in sales classes and related subjects. We plan on having a pocket-size water heater manual for each dealer sales person containing necessary information.

We will encourage dealers to set up service departments and will divert service work to those dealers in a position to do the job. We will assist in the education of dealer personnel in service work. Our dealer sales development consultants will assist dealers in closing sales only when requested and then upon the approval of the consultants' supervisors. The company personnel will be prohibited from giving tips and recommending particular dealers and makes of merchandise to prospects. Within reasonable limits, the company dealer sales personnel will assist dealers with floor and window merchandise displays.

Programs to educate the public on the necessity of adequate wiring will be organized. I should like to remark here that adequate wiring in the future must take a much more prominent place than it has in the past, if we expect to electrify the home satisfactorily.

We plan on cooperating even more with the manufacturer and distributor than we have in the past. We will offer our assistance and cooperate in putting on their educational programs where such assistance may prove advantageous to them. We will cooperate with the distributor and dealer in furnishing assistance in the introduction of accepted new electrical equipment. We will continue to encourage the dealers to promote the sale of quality merchandise.

In order to accomplish this program we expect to have in the field over the territory served by this company 19 home service consultants, 18 home lighting consultants and 22 dealer sales development consultants.

Before leaving the portion of the program devoted exclusively to dealer cooperation I wish to make this statement: If it can possibly be avoided economically, this company will merchandise no place in the territory served by it.

The remaining portions of our sales program, while not devoted exclusively to cooperation with the dealer and wiring contractor, nevertheless are developed with that thought in mind. For example, in our commercial and industrial program we expect to have power specialists who will confine their activities to the industrial field and will handle all contacts with industry, including industrial lighting. Then we will have what we term "regular consultants" who will confine their activities to commercial business. They will deal with commercial and institutional lighting, as well as small power applications in commercial establishments. A portion of the work that these men will be doing covers such fields as lighting, including general interior and exterior; architectural and structural, and state and highway lighting. They will include miscellaneous power applications, restaurant and institutional cooking and baking, air conditioning, specialized heating applications and adequate wiring. The advancements that have been made in the lighting and power fields in the years previous to the war and during the war years mean a lot of labor and the sale of a lot of material for the wiring contractor. Our employees who are devoting their time to this phase of our sales program will work very closely with the wiring contractor. As we see it, the future in electrification of commercial establishments and industry is extremely bright and, if our sales people and the electrical contractor work closely together, it will mean added load for us, additional sales volume for the contractor, and satisfied customers.

Our farm electrification program is being organized along the lines of expanded electrification on the farm with our farm service consultants working in close cooperation with both the electrical dealer and the wiring contractor. Irrigation, freezing lockers on the farms and many other farm electrical devices are just now reaching customer acceptance. And so the sales of electrical equipment on the farms are going to increase materially and once more our service consultants are going to work in close cooperation with the dealer and the contractor.

While our experimental laboratory does not have a direct bearing upon your business, it certainly does have an indirect bearing upon it. This laboratory is going to be greatly expanded. Previous to the war, its experiments covered farming equipment only. After the war, the laboratory will be expanded to include not only farm equipment but to experiment on new applications of electricity in industry and in the home. The results of this experimentation will mean added manufacturing and added sales.

In closing I want to point out this fact which has, I believe, been apparent. Our entire sales program for the postwar period revolves around closer cooperation with you people in this audience.

Washington Water Power

Ross B. McElroy

(Delivered in Omak, Spokane, Lewiston)

PRACTICALLY all the postwar planning I have heard about concerns itself with "capacity to produce," very little with "ability to consume." Yet when you come right down to it, the crux of the whole matter is largely in the laps of such men as you—with salesmen and the ability to sell, to consume—not with statisticians!

This evening I want to talk to you of the sales plans and policies of the Washington Water Power Co. and their relationship to you, the electric dealer. I want to talk to you of sales plans that are real and actual and that are already at work.

From the start, I want to make one thing clear and definite. Come victory, the Washington Water Power Co. is going to be in the picture with new, modern equipment to show and to sell.

This does not mean that the company plans to dominate the field. It does mean that its primary sales effort will be aimed at creating a desire on the part of Mr. and Mrs. Inland Empire for the fuller use of electrical servants in the home—letting the sales fall where they may.

Take a realistic look at the electric power resources of the five northwest states and you will see that, once the war industries slow down, this area will have on its hands a huge surplus of hydroelectric power. Engineers familiar with the operation of the Northwest Power Pool predict that this surplus will be in the neighborhood of 800,000 kw. in generating capacity.

What does that mean to you, the electrical dealer, and to the business managed public utility? It means, first, that this huge surplus of electric power is going to have to be disposed of as rapidly as possible, either under publicly owned and politically managed authority or under our American system of free enterprise. In that question you have an important stake. And unless American free enterprise can rally its forces for the sale of that power as quickly as possible, you and I are going to wake up one fine morning and find free enterprise and private initiative — the thing that has made America great—wiped out from under us.

Thirty years' experience in the active promotion of electrical merchandise has taught us that there is no substitute for utility participation in appliance selling as a means of creating customer acceptance and customer demand for electrical conveniences. New types of appliances are discouragingly slow in gaining acceptance unless the company puts the full force of its promotional and sales effort behind them. Even when appliances have gained customer acceptance, sales volumes do not rise as fast as they should without the constant pressure of organized industry-wide promotional programs.

Working together, utility and electrical dealer, can accomplish much for the benefit of all that, working separately, would be impossible. In a very real and intimate way the electrical dealer and the business managed electric utility hold a partnership and stake in American free enterprise.

For evidence of the advantages of this partnership glance back to pre-Pearl Harbor days. The Washington Water Power Co. was actively promoting wider use of electric service in just the same way as the company will be simulating appliance sales in postwar days to come. As a result, dealers were selling 95% of the total dollar volume of home appliances sold. And the company anticipates that this percentage can be increased in favor of the dealer after the war.

Prewar sales of major appliances by you dealers and by the company attained a 37% electric range saturation, a 32% water heater saturation and a 74% electric refrigerator saturation. Dealers, in 1941 sold 89% of the electric ranges, 85% of the water heaters and 99% of the electric refrigerators in this area. Postwar sales of these three major appliances should reach 6,000 electric ranges, 5,000 water heaters and 14,000 refrigerators annually. You figure your percentage of these yearly totals.

To do that kind of sales job in the face of keen competition for the customer's war savings by every industry in the book, the Washington Water Power Co. will undertake intensive promotion of electrical conveniences for postwar living, but, in addition, concentrated and coordinated sales cooperation between the electrical dealer and the utility will be required.

Manpower for sales power is demanded of any such plan. While the utility has experienced an unavoidable and extensive shrinkage in its sales organization during the past two and one-half years, the company has been successful in retaining a nucleus of key employees, especially in supervisory capacities, that is capable of quick expansion. To this end the company is now interviewing discharged servicemen as they become available and trying to fit them into the company organization.

Primary objective of the postwar residential representative of the company will be to sell greater use of electric service as distinguished from the sale of any particular make of appliance. However, where a customer may prefer to purchase equipment from the company, the representative will complete the sale.

It will be the company representative's responsibility to make a complete customer coverage of his territory at least twice a year. He will provide general assistance to the customer on such matters as rate applications, company policies, advice on the proper size and type of equipment best suited to the customer's needs, encourage adequate wiring and better lighting and, in general, sell the benefits of a greater use of electric service in the home.

Keyed to this activity will be that of the home service advisers. These young women, all college graduates in home economics, are carefully selected for their personality. In addition to clinics, schools and classes in all subjects related to the better home use of electric service, these home service advisers will demonstrate the proper use of equipment in the home to new users, and, where dealers will supply the names of new users, these young women will demonstrate equipment impartially, whether the sale was made by the dealer's salesman or the company's representative.

Many of you I am sure are familiar with the Inland Empire Electrical Equipment Assn.—an association of electrical dealers and contractors organized to coordinate promotional activities, solve common problems and establish sound sales practices and policies. Prior to the war, you recall, the Washington Water Power Co. carried on extensive advertising of assistance to dealers in the name of the association, requesting prospective customers to see their favorite dealer for new models and further information. Window and store display material was also supplied to help tie the dealer even more closely to the promotional activity in the minds of the public.

Come victory, these aids to more effective selling by the dealer will all be resumed — the assistance of the company representative, the help of the home service adviser, the support of the Electrical Equipment Assn., and the sale stimulus of advertising and promotional material.

In addition, a high type of merchandising consultation service will be offered dealers. This consultant will be qualified to advise on such subjects as store location and arrangement, merchandising displays, the use of light and color to enhance sales appeal, selection of merchandise, stock control, sales policies, the hiring and training of sales personnel, organizing campaigns, budget control of sales expense, advertising and countless other subjects that are likely to perplex the small dealer. Experienced merchandisers know only too well that often some seemingly inconsequential detail may spell the difference between success and failure in electrical merchandising.

In some parts of the territory served by the Washington Water Power Co., there has been a substantial increase of settlers on small tracts of land and, as war employment decreases, it is anticipated that this trend will increase and be augmented by returning war veterans. A high percentage of people who have been attracted to this area by war work have indicated their intention of remaining, many of them to take up small farming. To serve this growing market, an agriculturalist will be employed by the company. The work of this specialist will be devoted to the wider use of electricity on the farm such as electric-drive machinery, walk-in refrigeration, quick-freeze and hold-over storage, brooders, dehydrators, infrared and sterilizing lamps, farm home and outbuilding lighting, adequate wiring and line extensions to new areas. He will cooperate with manufacturers, distributors, dealers, and with farm extension departments of colleges, county agents and farm groups.

In the commercial equipment field, the postwar electrical dealer and contractor should find many sales opportunities. Lighting equipment is wearing out, much of it will be obsolete; so will cooking and air conditioning equipment. Whole store interiors are suffering from wear and over-age, and general remodeling should be widespread. Many war workers who will have experienced the stimulus of work efficiency of 40, 50 or 60 foot-candles of light on the working plane will be returning to civilian jobs and will not be content with less adequate illumination.

To serve this sales market the Washington Water Power Co. will employ a crew of all-service commercial representatives. These men will call on all customers at least twice a year and, for the most part, will be engineering graduates trained in the application of modern electric appliances and equipment to customer needs—especially in lighting for seeing, sales and safety, adequate wiring, heavy-duty cooking, water heating, air condition-

ing, infrared heating and refrigeration.

It will be the company's policy to encourage the customer to purchase commercial equipment from electrical contractors and dealers. However, commercial representatives will not hesitate to sell specific equipment themselves where such practice will help stimulate customer acceptance of new equipment or build up a demand that will ultimately benefit the dealer.

In the industrial sales field, the company's postwar plans call for an expansion of activity beyond anything attempted in the past. Primarily this effort will be devoted to encouraging the establishment of new plants in this area and the expansion of existing plants both as to size and type of products. Special emphasis will be given to the utilization of light metals now being produced in the Northwest, to the more efficient use of forest products and to agricultural by-products and wastes.

One of the important elements in the over-all postwar plans of the company is the reactivation of the cooperative organizations which in the past have proved so fruitful for electrical dealers as well as to the utility. In addition to the Inland Empire Electrical Equipment Assn., which I have mentioned, these organizations include the Adequate Wiring Bureau, the Better Light-Better Sight Bureau, the Kitchen Modernization Bureau and, newest of them all, the Indoor Climate Institute.

Indeed, there are opportunities ahead for the alert electrical dealer and contractor in the postwar Inland Empire. The Washington Water Power Co. has shaped its plans for that period to be of maximum assistance to the dealer and the contractor in the firm belief that, working together, all will prosper.

Pacific Power & Light

D. B. Leonard

(Delivered in Walla Walla, The Dalles, Yakima)

THROUGH years of pioneering and development, when consumer acceptance of electric appliances had not yet been established, the Pacific Power & Light Co. found it desirable to merchandise actively all types of electric equipment for the home and farm. By so doing, the company was able to build new load necessary for an expanding system and a requirement for an extensive and prolonged series of substantial rate reductions. That these policies and principles were successful is indicated by the records which show that the average use of service for residential customers increased from 322 kwh. annually in 1920 to 1,895 kwh. in 1943, and that the average cost per kilowatt-hour during this same period was reduced from 8.99c to 2.03c.

While our company was pioneering the sale of electric ranges and water heaters as a means of securing volume sales of electric energy, manufacturers were also busy designing and engineering new improvements and refinements in their products. Range elements were built as speed units to eliminate the complaint of slow heating. Time clock and thermostatic controls were added to electric range ovens. The efficiency and convenience of the modern electric range soon made it superior to all other types.

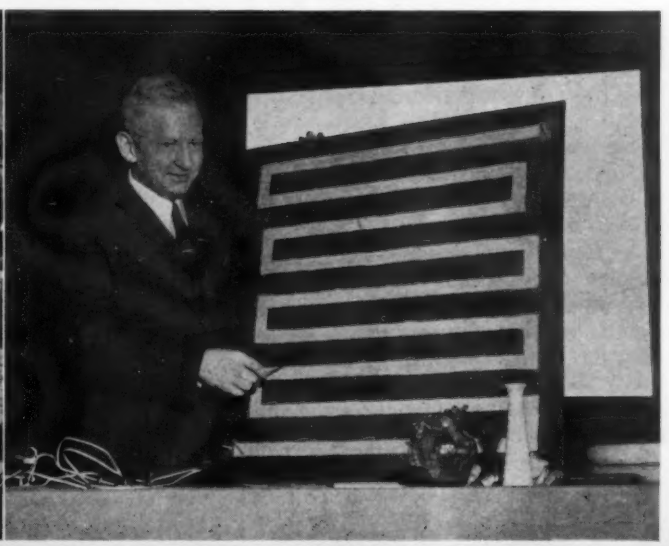
In May 1941, another of a series of rate reductions was announced, and the average cost of cooking electrically was lowered to $2.25 per month, a cost which eliminated much of any sales resistance still remaining on ranges. At the same time, a block of 500 kwh. each month was offered for water heating on a combination off-peak rate at 7 mills per kwh. For a maximum cost of $3.50 per month, up to 1,600 gallons of water could be heated electrically to provide similar supplemental service to the clean, cool, fast and economical electrical cooking service. Range and water heater sales skyrocketed. Dealers could not get deliveries sufficient to meet demands. Customer acceptance was established beyond any doubt and in September 1941, direct sales of major appliances were discontinued by the Pacific Power & Light Co. in all district and local offices.

Today in outlining our postwar load building plans, our program of necessity must be built around the key individual, the consumer, user, purchaser or person who pays the bill in the final analysis. The Pacific Power & Light Co. will develop a sales policy which will bring the maximum benefit from the use of electric service to the greatest number of individual consumers in all classifications. In so doing the greatest long-range service will be extended to the manufacturer, jobber, distributor, wireman, dealer and utility alike. Such a policy recognizes the following general principles:

1. Franchised dealers with standard lines of electrical appliances are typical examples of small business enterprises operating under the American system of free competition to form an integral part of a sound economy. Our future, likewise, is dependent on the preservation of the American system of enterprise, so we pledge to all dealers with whom we share mutual interests, our full cooperation and assistance that they may continue to operate as successful business enterprises. A full staff of dealer coordina-

Dealers and contractors at the meeting held in Seattle

Berkeley Snow shows conductive silver paint for heating



tors will be provided to assist in sales training classes on salesmanship, to provide manuals on water heating, information on rates, service and to provide such other dealer helps as may be desired.

2. Assuming that dealers of electrical appliances will provide full sales and service coverage in all urban and rural areas served by the utility, the policy of the Pacific Power & Light Co. will be to relinquish all direct sales of major appliances entirely to local dealers. If sufficient coverage and sales volume is not developed by dealers, we may be required to step into the field with direct sales to help build customer acceptance, but our present thinking is that dealers can and will do a real job—satisfactory to manufacturer, distributor and utility alike, with no direct sales of major appliances by the utility. No tips or recommendations will be given by utility representatives on particular brands of merchandise. Dealers will be obliged to secure their own prospects and close their own sales.

3. Dealers must recognize their responsibility to the key individual—the purchaser and user of the appliance by maintaining fair prices with a full margin of profit to provide adequate repair and maintenance service during the guarantee period, and similar service thereafter at reasonable service charges throughout the normal useful life of the device. It is not the plan of Pacific Power & Light to engage in the business of electric appliance repair service.

4. The company will continue to make direct sales of small appliances, lamps and lighting primarily as a means of maintaining contact with customers with an educational program on utilization devices. Lighting schools and demonstrations will be held for dealers in dealer stores if desired, to assist their employees in developing a greater volume of lighting sales.

5. The company will maintain a staff of home service advisors, will hold dealer training classes, cooking schools, and will advertise and publicize the use of electric devices to help create a broad market. In return for these services, the utility will request reports on unit sales of appliances to measure the results of these programs and to analyze the need for additional sales promotional activity. Summarized results from dealer reports will be provided for all dealers with such comments, analysis and suggestions as may be found helpful.

6. The value of modern electric equipment appears to be sufficiently well established to make such practices by the utility as providing advertising subsidies, free wiring, the use of premiums unnecessary, and these services will not be provided by the company. Such subsidies serve only to delay or retard possible reductions in the cost of electric service. Our aim will be to continue to make rate reductions or rate dividends to customers as frequently as justified. Thus the more rapidly dealer sales create markets for kilowatt-hours, the more frequent and extensive will be the rate reductions, to further broaden the market toward the ultimate 100% saturation on all appliances.

7. A well-planned series of advertisements will be published in newspapers, over the radio, on billboards and through window displays to feature the use and low cost of electric service, in a manner designed to stimulate appliance sales by dealers.

From these remarks it is evident that much depends on the people in this room as dealers in electrical equipment. In closing, permit me to say that we pledge ourselves to an all-out cooperative effort to further a greater volume of dealer sales of appliances of all types.

Associated for United Industry Effort

Teamwork will assure electrical business its share of sales in highly competitive markets

Ross B. McElroy

Delivered in Omak, Spokane and Lewiston
By
C. E. Hess

WHEN we cast a glance to the future, none of us can help but be optimistic on the post-war Northwest.

In the past three years this area has advanced industrially twenty to fifty years! Thousands of newcomers, attracted by war jobs, have poured into the Northwest. The vast majority of them expressed a definite intention of staying.

The sheer magnitude of the opportunities ahead is likely to fool us into thinking that our future as electrical dealers and contractors is a bed of roses, that destiny is ours on a silver platter, that something bigger than the gold rush is developing around us.

Unquestionably there are opportunities ahead, but coupled with them are grave responsibilities. Can business absorb the shock of the transition from a war economy to a peace economy? Can jobs be provided for all who will want them? Can free enterprise carry the load or will we again have to fall back on a government-planned economy, on government-provided jobs and see the spread of still further government control?

These are big problems. They are our responsibility. On their solution will depend the future of all of us. Alone, none of us can do much about them, but working together as an industry—the electric utility, the electrical manufacturer and distributor, the electrical dealer and the electrical contractor— working together we can do much to see that our opportunities as free men are preserved. We can do much to bring the rosy-hued vision of the future into sharp focus of reality.

We in the Northwest are fortunate in having a going organization that can marshall and unify our strength —that can get things done for the benefit of all, which would be impossible of accomplishment with each of us working alone. I refer to the Northwest Electric Light and Power Assn.

The association was organized in Seattle in 1908, "to foster and protect the interests of its members and to promote the welfare and progress of the electrical industry." It includes four classes of membership—individuals, industry members, utility companies, and honorary memberships. The association has 789 individual memberships, 68 industry members, 18 utility members and 9 honorary members for a total membership of 884.

The functioning of the association is carried on through three sections: Accounting and Business Practice; Engineering and Operation, and Utilization; and in addition, a Personnel Conference, functioning much like a section.

Meetings of these sections are held during the year. Committees make studies and report at these meetings. Discussions are held on timely points of interest. Facts, views and opinions are exchanged. Through these contacts members are able to gain information which helps them shape their policies, make their plans and put these plans into effect. Here, truly is the voice of the electrical industry in the Northwest.

The association has made better accountants, better engineers, better salesmen, better executives and community leaders among the men who have belonged to it and taken part in its activities. It can do the same for any electrical dealer or contractor sin-

cerely interested in the advancement of his chosen profession.

Quite frankly the association seeks the opinion, the experience and the counsel of such men as you. It realizes that you as electrical dealers and contractors have an important role to play in the postwar Northwest. It seeks your help in the shaping of policies and plans for your well-being and that of the industry as a whole.

Certainly in your own community where, for instance, unfair business practices might hamper your operation, the weight of the association, its guidance and active help behind your efforts could mean much.

Again, in the development of industry-wide programs, you should have a voice in shaping plans so that you can gain the utmost from them. The association offers you that voice, for in all cooperative programs—adequate wiring, kitchen modernization, better lighting and similar programs—you are a vital link in their success.

In truth you have much to gain from the association and the association has much to gain from your participation in its activities. There are opportunities and responsibilities ahead for the electrical industry. Working together we can solve the problems to the mutual benefit of all, just as we can capitalize on the opportunities for the benefit of all.

And so I extend the hand of the association in good fellowship. I invite your membership and participation in its activities and benefits.

Then When the Shooting is all Over—

There should be no "Pearl Harbor" of unemployment if dealers make sales that start production going

Dr. G. W. Allison

AS a nation we are faced with one of the most serious situations with which we ever were confronted. At this moment, our American boys are fighting on the same ground that our boys were on in 1918. No doubt there are men here in this room who were in that first affair.

The winning of this war must be the number *one* objective of each and every American; it must be the *one objective* to which all other considerations are secondary. There is only one way out of this war, and that is to fight it out to a finished fight. To this end, all of us here on the home front must give all we can in every way we can to see that our boys have the equipment and the supplies necessary to the winning of this war.

I also think that we on the home front are duty-bound to see to it that, when our boys do come back, they will find here at home, firmly established, the very principles for which they are now fighting. I do not agree with those who belittle postwar planning and speak of it as something that should not now be undertaken. But I believe we must get ready for these boys when they do come home. I think that we here at home are obligated to see to it that these boys do not come back to privation, suffering and want. I feel quite sure that a lot of talk about the collapse that will follow this war is a bit overdrawn; in my opinion it is not necessary that we have a disastrous collapse. Immediately following this war we will have the four fundamentals for prosperity—

1. A demand for merchandise.
2. The materials out of which this merchandise may be processed.
3. The manpower and machinery with which to do the manufacturing.
4. The money with which to finance the operations.

These four fundamentals are going to abound when this war ends.

All of us know that there will be a tremendous demand for merchandise or products. Last fall the United States Chamber of Commerce completed a survey which was conducted throughout this country covering no salaries above $4,000. That survey revealed that 1,540,000 families intend to build a home within six months after the war ends. The dollar volume of business accruing from this activity would be $7,184,800,000. Then there were figures from those who intended to improve their own homes immediately following the war; and the total dollar volume of business here was $7,500,000,000. Such an activity would put thousands of men to work in the building industry. Think of the other thousands of persons put to work in industries which supply the building industry!

All of us know there will be a tremendous demand for merchandise; take our electric industry the same survey to which I have referred, and remember, it covers only $4,000 incomes and down. This survey revealed that within six months after the end of the war there would be a demand for 2,625,000 refrigerators, 1,645,000 stoves, 2,555,000 radios, 2,100,000 washing machines; these with the various other appliances brought a total dollar volume of $1,215,910,000. Remember this survey was made last fall; the demand for these appliances is much greater today.

This demand for electrical merchandise is not based upon mere fancy; for years we have been selling refrigerators, ranges, water heaters, and various other household appliances to the American homes. These housewives know the value of these appliances, they know there is a real health angle, a real economy feature, and a positive factor of convenience in these appliances. American housewives insistently demand these appliances in their homes. We are not going to reduce our standards of living in this country.

It is easily seen how in getting ready for this postwar period we shall be contributing to an era of prosperity. Several years ago, the United States Chamber of Commerce put on a campaign "Sales Mean Jobs"; this campaign was designed to stimulate sales activity which would stimulate buying, and such in turn would stimulate manufacturing, thus creating jobs and producing prosperous conditions.

We would not have you get the idea that this demand for merchandise in the electrical industry would bring a windfall of business to you dealers. We are going to be compelled to plan for this postwar period. We must get ready for this new era. We cannot expect to succeed with the old methods of the past. As you were told tonight, the electrical industry is changing, it has advanced during the short period of this war many years

Tonight you have seen demonstrations of electrical equipment that give hints of the many new devices that will be on the market when this war ends. That alone is enough to indicate that we must get ready. All of us read and heard, immediately after Pearl Harbor, this phrase: "If we had been ready," "If we had been ready." Over and over that phrase was repeated. We were not ready for this war and all of us know the real difficulties we have faced because we were not ready. Our enemies were ready! They seized valuable possessions and entrenched themselves deeply, and the fact that they were ready and we were not cost us considerable in both men and material. We know that peace is coming with its postwar readjustments, and we must be ready to meet this postwar period. If we are ready we shall succeed—if we are not ready we'll pay the price for our neglect.

Dr. George W. Allison, known throughout the country for his work in the National Refrigeration and Kitchen bureaus

The manufacturers are doing everything they can to instruct and help dealers to get ready for this period. These booklets that have been offered you have been written by some of the best merchandising brains of this country. At no expense you have the opportunity to determine whether your store is properly located, whether it is properly laid out for making the best displays of merchandise; you may know for sure whether your windows are properly built for the most effective window displays. In fact, there is not a phase of the retail merchandising of electrical appliances that you cannot investigate.

Maybe you are wondering whether this spurt in business will really be worth all this trouble? Time and again have I been asked by dealers, "When will we hit the peak in appliance selling, when will these appliance sales level off?" These questions seem to indicate that dealers believe we are approaching saturation in appliance selling, and some seem to believe that, when every home has these appliances, the business will be over.

Do you believe that "saturation" hurts business? Let us look at this for a moment. "Saturation" actually makes a business. For example, let us take the house-furnishing business. If there is any business that has 100% "saturation" it's the house-furnishing business. You cannot think of a shack, a cabin, or a home anywhere in this country—a place where people live—that does not have chairs, tables, rugs, beds, and other furnishings. I don't know how long this has been so, but I imagine it has been since the last caveman swept the bones out of the cave. Well, this 100% saturation has just ruined the business, hasn't it?

House-furnishing stores are the best establishments in any of our towns; they have the best locations, the best warehouse facilities, the finest show windows, and they do a lot of full-page advertising in the local papers.

You see those fellows have 100% "saturation," but they act just like business was good. And their business is good. The fact is that there was more time payment business done in house-furnishing sales, prior to the war, than in automobiles. The automobile industry is another good illustration of this same idea. Prior to the war, there were three automobiles for every four homes of this country. That is pretty good "saturation"!—75%, but did it wreck the business? Well, the automobile industry only sold 4,000,000 automobiles that year. You see "saturation" just ruins the business, or does it? When every home in this country is an electrical home, we will sell more merchandise and sell it at less cost than we do today.

Another way for us to get ready for this postwar period is to cooperate with all dealers, manufacturers and utilities. We have learned some valuable lessons as to the value of *cooperation*. The Electric Refrigeration Bureau was organized in the beginning of the depression, it was a cooperative merchandising and selling activity. We know what happened. The year before the bureau was organized, the industry sold 750,000 electric refrigerators. Through cooperative activity, refrigeration sales increased all through the depression until we were selling three and one-half million refrigerators per year. "Better Light for Better Sight" was another cooperative activity organized right in the depths of the depression. At the time this activity was launched, the lamp manufacturers were just about ready to fold up and go out of business. The cooperative activity on lighting soon had the lamp manufacturers running their plants full time.

We have brought you the Northwest Electric Light and Power Assn. as another medium of cooperation. Through this association you can know the possibilities of the industry. You can know what's going on. You can be advised in advance of campaigns when they are going to run, and how they are going to operate.

A demand for the merchandise is here now. The materials will be available. There will be plenty of manpower and ample money to finance the activities. All we need do is to get ready—cooperate with all other people in the industry, and we shall be successful.

New Equipment That Opens New Markets

Previews of new developments that promise to bring entirely new fields of sales and profit

WHEN we set out to bring to these meetings some new equipment for demonstration, we found ourselves pretty well stymied. Most of the new equipment we all expect after the war is now very much "hush-hush" on account of the war, or secret on account of competition, or restricted by wartime controls. We do have some indications of new equipment, however, and will show in the course of this evening, certain devices, some new and some comparatively new, that will tend to point the way for our thinking and the play of our imaginations in planning for after-the-war development.

New Lighting Sources and Applications

One general statement as to lighting equipment can be made: Architects and illuminating engineers will design lighting effects to fit into the architectural features of the building, and lamp and fixture manufacturers will build equipment to achieve these effects. We noticed this trend before the war and find, in examining the plans of the manufacturers, that this trend will be continued and will be accentuated after the war.

Lamp manufacturers are already experimenting in their laboratories with new shapes and sizes of fluorescent tubes. General Electric Co. has loaned us wooden models of some of the new long-tube and thin-tube fluorescents they are now working with. These we have here are ½-in., ¾-in. and 1-in. tubes 5½ ft. long and a ¾-in. tube 8 ft. long. The only places the actual tubes can be seen now are in the laboratories at Nela Park, where they are under test. General Electric Co. cannot now state what the wattage of these tubes will be, nor what light output they will have. They are designed chiefly for commercial applications where long runs of fluorescent lighting will be required, such as in show cases, show windows, or in places where long strips of light are needed to fit into the architectural design of the store.

Another new shape of fluorescent now being developed by the lamp manufacturers is the circular fluorescent, of which you have heard. Here are wooden models of these lamps furnished us by General Electric Co., 3 sizes with ¾-in. diameter tubes; 8½-

in., 12½-in. and 16-in. outside diameter of the circle. These lamps will have approximate wattages of 20, 30 and 40 watts, and an approximate light output equivalent to incandescent lamps of 60 watts, 75 to 100 watts, and 100 to 150 watts respectively.

Nobody has yet designed any fixtures in which to mount these lamps. If you will note, they have great flexibility both as to wattage and light output, since they can be mounted in a single plane, or one above the other in conical arrangement, or one or more of them in combination with incandescent lamps, as for instance in the standard IES design with the incandescent output thrown upward and the fluorescent mounted below it for downward light. The design of fixtures to use these lamps will furnish plenty of opportunity for applying imagination and ingenuity. Unquestionably these shapes will find many unique uses and applications, chiefly in homes.

Westinghouse lamp department has furnished us with wooden models of these circular fluorescents in color, indicating the decorative effects that can be produced by these tubes.

Two lamp sources not new but comparatively new, which will find a much increased use after the war, are the infrared drying lamp, used chiefly for drying paint in industrial process, and the ultraviolet germicidal lamp, used to reduce airborne bacteria. (These lamps were lighted and shown).

The infrared drying lamps have had numberless successful applications in war production and will find increasing use in peacetime industry. They are also being applied to the dehydration of fruit and vegetables and may find greatly increased uses in this field.

Germicidal lamps, used chiefly in hospitals, schools and factories, will likewise find increased application after the war in places where a high degree of air purity is desired. This is the 15-watt germicidal lamp shown here. The 30-watt lamp, in an air duct of non-reflecting material, will disinfect 1,000 cubic feet of air per minute. If the duct is lined with a material that is a good reflector of short-wave ultraviolet, the amount of air that can be disinfected by the lamp will be materially increased. This lamp is also being used to keep down the growth of mold on meat and other foods. An increasing use in this field may be expected.

Precipitron

The electrostatic air filter produced by Westinghouse under the trade name, Precipitron, will find many useful applications after the war in places requiring especially clean air. This device will remove dust particles from

A small model showing the principle of the Precipitron is demonstrated to the dealer groups by Berkeley Snow

the air down to 1/250,000 of an inch in diameter. Suggested uses for it are in chemical laboratories where clean air is required for delicate experiments, machine shops doing fine precision work, hospitals, restaurants, textile mills and homes.

The principle upon which it operates is as follows. A fine tungsten wire is placed on either side of a grounded tube. When 13,000 volts positive d-c is applied to the wire, a strong electrostatic field is created between the wire and the ground rod. All the air passes through this field and each particle gets a surface charge. The air is moved to the next chamber containing collector plates. These plates are charged with 6,000 volts d-c alternately positive and negative. Like charges repel and unlike charges attract. All these tiny particles in the air are drawn to and precipitated on one of these plates. Periodically, the plates are washed and the collected dust particles are flushed into the sewer.

A small demonstrational model of the Westinghouse Precipitron was then demonstrated, using cigarette smoke as the dust-laden air to be cleaned by the device.

Paint as a Heating Element

The Puget Sound Power & Light Co. laboratory, under the direction of C. W. Wildebour, has been experimenting for some time with painting a heating element on a non-conducting surface such as masonite or plywood, with the idea of securing a uniform temperature over the interior surface of an electric brooder. First experiments were with graphite, electroplated with copper.

Quite recently the DuPont company announced a silver-base conducting paint advertised for use as an electroplating base. Mr. Wildebour tried this medium for his heating element and found that the paint had good conductivity and measurable resistance. Here on this masonite board is a strip of this DuPont silver-base paint about one inch wide, 16 to 18 ft. long, between these contacts. This design pulled about 400 watts and heated the surface of the panel to a temperature of 210° F. This was one of the earliest experiments with this paint, and the temperature achieved was much greater than needed. The paint costs $1.10 an ounce and there is about one-half ounce of paint on this panel.

These experiments opened some rather interesting avenues of possible development. This paint could be applied to any interior surface in sufficient amount to produce an even temperature on that surface of approximately 100° F. The surface could then be covered with any conventional type of wall covering—paint, kalsomine or wall paper. The heating element would be hidden and yet would warm the wall, ceiling or floor, or whatever the surface to which it was applied. This suggests auxiliary room heating; foot warmers for a cold floor and many other applications.

It should be borne in mind, however, that the use of this paint as a heating element is still very much in the experimental stage. No announcement can be made now as to any specific application or use, but let's see what Mr. Wildebour can bring forth and, in the meantime, some of those present may wish to do a little experimenting with this paint on their own account.

(Snow demonstrated the conductivity of the paint with a special panel on which a small light was connected to a circuit by two parallel strips of paint about two feet long. By scratching with a pen knife through one of these strips, the circuit was opened; then by painting over the open with some of the DuPont silver-base paint, the circuit was again closed and the light came on.)

Black Light

(Snow demonstrated the fluorescent qualities of a number of substances under black light bringing out chiefly the use of this light for producing spectacular effects in display, and also its use as a selling tool for portraying how electric signs and store fronts would look lighted at night. As a climax closing the demonstration, he changed himself quickly from Dr. Jekyll to Mr. Hyde with the use of some simple make up properties, painted in fluorescent paint, and a little vaseline.)

Signs of Life at Fall Market

An automatic washer the only merchandise shown but everyone ready to emerge from hibernation

SIGNS of spring after a long winter freeze could be detected at the Fall Market of the Western Merchandise Mart, San Francisco, during the week of July 24. Electrically speaking the appliance exhibits, once the showplace of the Mart, were still under a heavy blanket of ice, frozen for the duration or thawed only on hot priority. Most of the exhibitors had no appliances whatever to show. Except for gas ranges, orders could be taken for none that were shown as yet. Nobody knew when any appliances would be available but dealers flocked in eagerly, reminiscent of more fruitful days, anxious for the first signs of the thaw. Exhibitors reported a big day, Monday, with dealers and prospective dealers so numerous that they had difficulty meeting them all, with attendance tapering off during the latter days of the week. Significant were the number of inquiries from dealers who never before had handled appliances or from men, some in the armed services even now, making inquiries as to the possibilities for starting in business when the war is over.

● WESTINGHOUSE probably had the stellar attraction at the market from an electrical appliance standpoint. The first working exhibit of its new automatic washing machine, the Laundromat, was given by Miss Lois Ferris, Pacific Coast district home economist.

J. F. O'Donnell, assistant sales manager in charge of the Pacific Coast district of the appliance division, had three executives of the division from Mansfield, Ohio, on hand to confer with dealers and take part in the activities of the Fall Market. I. Frank Brownson, manager of the laundry equipment department; Vale E. Freeland, director of the department and furniture store sales, and Charles H. Guy, assistant sales manager of the appliance division, were in San Francisco during Market Week and then Freeland visited Los Angeles. Brownson and Guy accompanied O'Donnell to Portland and Seattle. John N. Barker, northern California district appliance manager for Westinghouse Electric Supply Co., took a prominent part in the Market Week activities.

The Laundromat was demonstrated to newspaper and magazine home economics writers and editors as well as to dealer groups. The only question left unanswered was when a supply could be expected of the attractive automatic washing machines in the region for distribution to dealers. The working models were kept busy washing clothes and going through their automatic cycle throughout the week. Announcement was also made that Westinghouse would place a complete line of freezer cabinets for both city and farm use on the market after the war.

● EDISON GENERAL ELECTRIC APPLIANCE CO. INC. (Hotpoint) opened a Space 767-A as its new regional offices in the Mart for the eleven Western states and Hawaii. Ward Schafer, regional sales manager, was on hand to discuss future appliance merchandising plans with visiting dealers and utility men.

● KELVINATOR had a small space on the fourth floor from which C. J. Bachman, Pacific Coast general sales manager; Ralph Weingartner, and Cal Fleeson discussed postwar plans. A home freezer unit to fit into an all-electric kitchen ensemble, including electric range, refrigerator and water heater, was shown by means of attractive drawings. The same distribution as prevailed before the war is contemplated by Kelvinator, part factory branch and part distributor.

● UNIVERSAL'S "U" plan for "V" Day and advance samples of two of Universal's wartime electric hand irons were the electrical features at the Thompson - Homes exhibit on the fourth floor. A great many dealers hearing of the "U plan for V Day" signed to participate in it and there was eager questioning regarding the availability of the first electric iron.

● GENERAL ELECTRIC SUPPLY CORP. was quite unelectrical with displays of oil and gas heaters and cotton insulation for homes but reported eager interest in G-E franchises for appliances as soon as they are available.

● GORDON E. WILKINS INC. reopened a space at 868 in the Mart to discuss postwar distribution of Ironrite Ironers.

● LEO J. MEYBERG CO. had an active display booth showing Norge gas ranges, a priority-frozen refrigerator and the shell of a Bendix washer. The exhibits of radio and electrical parts and supplies and of Victor records made the space attractive.

● H. R. BASFORD CO. had a single model of a Premier vacuum cleaner, a Zenith phonograph combination, a Gibson refrigerator and Columbia records on display, but no orders could be taken except for the photograph records.

● STROMBERG-CARLSON in its quiet space in the corner showed only a few pieces of its telephone equipment, now its major interest in the war production business.

● EASY WASHER has its Pacific district offices in the Mart and Fred Fenton was talking to dealers who visited about the attractive plan book this company has issued to dealers to aid them to construct an attractive washing machine department.

Numerous other exhibitors, once handling appliance lines, were filled with gadgets and jimcracks, toys and costume jewelry, a wide and ingenious assortment of non-critical material gadgetry to offer as something to sell until electrical merchandise returns. The houseware exhibitors on the fourth and fifth floors issued a second portfolio on available merchandise, featuring advertisements of a number of exhibitors and listing merchandise now available.

Altogether it was a market ready to burst into blossom if given half an opportunity.

Predicts Television

Predicting a television station in every major city in the United States at the end of the war as quickly as transmitter deliveries can be made, Philco Corp. also predicted table model receivers costing as little as $125 and larger projection type sets, giving a picture 24x18 in., costing up to $400. Philco also announced a pent-up demand for between 20,000,000 and 25,000,000 radio receiving sets at the end of 1944, as compared with the total industry's all-time high production of 13,000,000 units in 1941. Licensing of more FM radio stations because the channels can be individually controlled to narrower bands and the announcement that major broadcasting chains will make their top-hit programs available to FM audiences, Philco's Larry E. Gubb, chairman of the board of directors, said recently, would start a real boom in FM receiver sales.

Take Service Training into the West

Frigidaire conducts two types of correspondence course and follows with practical field classes

H. J. Grams
Factory Service Representative
Frigidaire, Oakland

WITH a commendable accomplishment for the first part of the year, the Frigidaire Division of General Motors, Pacific Coast region, is setting up the procedure to carry on its successful training program into the fall. This will be done much on the pattern of the program as carried on the early part of this year. Meanwhile its mail training program has continued throughout the summer.

Early this spring Frigidaire started with a very intensive training program for its own dealer service men. This consisted of two separate types of training.

The first type was a course designed to be handled by mail and to reach all dealer service men, regardless of their location. It was also designed to teach beginners refrigeration service so that the dealer could increase his force of refrigeration service men.

This was a correspondence course consisting of two separate courses. The primary training course consisted of twenty-four individual lessons. The first twelve lessons covered the fundamentals of refrigeration and also any necessary service on the Frigidaire household refrigeration cabinet. The next twelve lessons in this primary course covered the older type of reciprocating compressor as used in the Frigidaire household cabinet.

This course was designed so that a person could take the first twelve lessons and at that time would know enough about refrigeration to start working for a dealer on the simpler refrigeration problems. The last twelve lessons were so designed that the man's knowledge of refrigeration would be increased while he was working on the more elementary stages of household refrigeration.

A second correspondence course is known as the post graduate one. This consists of twelve lessons which were designed for the service men of several years' experience. It also covers commercial and air conditioning refrigeration and both service work and engineering.

It was felt that these courses were so designed that they were not correspondence courses as normally taught. In other words, the person studying the course would not answer questions after he completed studying one lesson; in most cases he found it necessary to draw graphs or charts which would indicate to the company whether he actually understood the principle of refrigeration discussed in the particular lesson. This made it interesting for the man taking the course and at the same time simple to correct the answer papers for each lesson. In such a course was also incorporated a history of refrigeration, which proved both interesting and entertaining to those taking the course.

The first course was started in the early spring and is still being carried on with new students being accepted every day. Present plans are to carry this same course through the winter and next year. At the present time there are 686 students enrolled in the primary training course on the Pacific Coast and 162 students enrolled in the post graduate training course. This, Frigidaire feels, is a large percentage of the service men working for dealers on the Pacific Coast.

Difference in enrollment in the courses is explained by the fact that men are required to finish the primary training course before a post graduate course can be taken. No man will be supplied both courses at the same time.

In the Los Angeles district, because of the large concentration of service men in the City of Los Angeles, it was decided to hold an evening school for beginners. This school was held for two nights a week for a period of twelve weeks and covered the information contained in the primary correspondence course. The school was open to new service men in the employ of dealers or prospective service men recommended by Frigidaire dealers. The total attendance was 64, with 62 of the men being graduated from the school. Of the number graduated, the majority are now employed by Frigidaire dealers on service work.

Such a corrspondence course is available to all employees of the company's dealers, approved service stations and ice cream companies. It can be secured by any person interested in refrigeration, providing he is recommended by one of the dealers, also providing the man is genuinely interested in refrigeration work and intends to enter the employ of one of the dealers.

At the same time, the factory also planned and conducted a series of factory conducted service training meetings at different points on the entire Pacific Coast. This also included the Western half of Texas and the State of Montana. These meetings were scheduled to fill the needs of the individual Frigidaire districts and consisted of training both for the new and/or the older service men. In each

Learning by doing and seeing it done, small groups of dealer service men were given instruction by factory service men who covered most Western cities

case it was decided by the individual district.

Meetings lasted from two days to two weeks, again scheduled to meet the needs of the individual district. The total attendance at these different meetings consisted of 312 new and old service men and the meetings were carried on during the months of February, March and April. During the summer months none of the factory or district meetings were conducted but in the fall it is planned to carry on an intensive training for both old and new men. This should start around Nov. 1. In all there were 75 district schools in the entire United States and a total attendance of 2,000, so the proportion from the West was very good.

● FRED WOLTERS ELECTRIC CO., Salt Lake City, has made a few slight changes in the arrangement of his store during the past year. More and more the china and giftware pushes the remaining electrical goods to the rear of the store. The office has been moved to the rear to provide more display space and so have the fittings and wiring devices which are still in demand. The lighting fixtures booths are arranged to have kitchen and bathroom fixtures in one booth and other types in another booth. Wolters has increased his stock of gifts, pictures, carved figures, figurines and has added perfumes. By keeping a high-grade stock, the business is maintained on a high-class level. Although fixtures and electric stock is dwindling, the repairs are increasing. Delays are experienced in getting parts for many appliances brought in.

● PRESSURE COOKERS are being tested by Pacific Gas and Electric Co. as an aid to its customers to eliminate the danger of food spoilage. Experience with cookers has shown that the gauges may be out of calibration on both the new and used cookers, either the dial or slide type gauges. With newspaper publicity and radio announcements, customers are invited to inquire about the program at the nearest PG and E office, and the testing will be done without charge.

● THROUGH THE PORTHOLE is a new monthly publication which the Bendix Home Laundry Institute has started for distribution to home economists. The institute has just been established at South Bend, Ind., with Edwina Nolan in charge as director of home service. Its purpose will be to send out information on laundry methods for the home, prepare classroom material, confer with home economists on demonstration methods, and prepare material for salesmen and dealers.

"I See Where—"

Trade gossip about the future

● DISTRIBUTION CHANGES can be looked for, some of them pretty radical. *Tide* magazine says General Motors may revamp its entire distribution set-up, making each dealer a sort of General Motors general store.

● CHRYSLER, the gossip goes, may enter prefabrication of houses as well as going in strongly for home cooling and air conditioning.

● ADMIRAL CORP., which recently bought out Stewart-Warner, is overhauling its freezer to make it a two-barrel job with two temperatures and a sterilizing lamp to control mold.

● EMERSON RADIO has devised a "P.D.Q." plan for its dealers setting up a "preferred delivery quota" registration for future radio sets. The company also plans to go in for table model television sets.

● ADEL PRECISION PRODUCTS CO. of Los Angeles, a Transamerica owned company, is busy with war production for the aircraft industry has very definite plans for making an electric vacuum cleaner and small electric mixer, among a number of other kitchen items. It has recently conducted a consumers' survey to find out just what features consumers want in homewares.

● DREAM HOMES which people expect to get with little or no money are worrying the National Association of Home Builders enough that a publicity campaign is being started by Steve Hannagan to deglamourize the future home building idea and bring it somewhere within economic reason. In a survey conducted in eight cities, one of them San Francisco, among the middle class with an average annual income of $3,000, more than half of those interviewed expected to get a six-room house with two baths, complete with air conditioning, electronic controls, plastic plumbing fixtures, movable partitions and other gadgetry and pay only $52 per month.

● FROZEN FOOD LOCKER operators will retail home freezers in the postwar, according to a survey conducted by Edison General Electric (Hotpoint) Appliance Co. among 5,000 locker plants. This is interpreted by Hotpoint as an indication that with the support of the locker plant operators there will be a greatly stimulated development of the market for frozen foods and the opportunities for dealers to sell home freezers will be enlarged.

● ELECTRIC RAZORS should appear soon after materials are available, Schick, Inc., has announced, saying that it would take very little changeover to resume manufacture of electric shavers.

● CROSLEY CORP. viewing the staying power of independent distributors, despite the curtailments and hazards of war, has determined to handle its future distribution through them instead of through factory branches, according to J. H. Rasmussen, commercial manager, in a brief talk discussing some of the future products planned by his company. "If the independent distributor could weather this storm, then he is the rugged American who can meet the challenge of the future in the radio and appliance industry." Crosley will probably be in the market with refrigerators, home freezers, room coolers, radio of both FM and AM, television, and several home appliances.

● CONLON CORP. recently bought out the heating pad division of the Eagle Electric Mfg. Co. as a start toward the introduction of a full electrical household line.

One of a series of ads with which California Electric Power Co. won the Pacific Coast award in the Public Utility Advertising Assn. contest for the best customer service newspaper advertising. The series, which featured friendly individual employees and the kind of wartime service they are giving, was run in the spring of 1943

If things go wrong with your electrical ranch equipment...
"Ask George"
GEORGE E. GERTZ is your Agricultural Specialist
We know what you're up against. Mechanics are hard to find. Electricians are scarcer than hen's teeth. There's a shortage of farm labor. Equipment is hard to replace. Spare parts are becoming fewer and fewer. And yet the nation is looking to you to produce bigger crops.
We're in it, too. Over 20% of our manpower is in the armed forces. But by careful planning we are maintaining services to our agricultural consumers.
Depend on this, our sleeves are rolled up, just like yours. We are ready to work 24 hours a day to help you keep food rolling to both war and home fronts.
CALIFORNIA ELECTRIC POWER CO

Civilian Goods?

WPB orders and trends anticipate changes

● WATER HEATER production on limited scale (37% of 1940-41 base period) has been approved for civilian production by WPB. This will eliminate the necessity of appeals for replacement of electric water heaters. Control of electric water heaters shifted from L-65 (electric appliances), to L-185 (plumbing and heating). Metal jackets are also authorized instead of paper and production is limited to three sizes, with only one model allowed per size.

● ELECTRIC IRONS can also be made by three more manufacturers to bring the total quota over the 2,000,000 mark. The newest authorized makers are Siles Co., Circleville, O.; Industrial Tool & Die Co., Minneapolis; Birtman Electric Co., Rock Island, Ill.; and Chicago Electric Co.

● VACUUM CLEANER advisory committee met with WPB to discuss reconversion for civilian production. Manufacture will not be authorized now but may after Germany falls. Planning may be done and some materials and parts may be authorized made but, as in the case of irons, it depends on manpower availability without competition with essential war production. Materials for experimental models may be permitted.

● RESISTANCE WIRE made of chromium and nickel will be more restricted for use in domestic or commercial electrical appliances, WPB ordered. Chromium is not to be used except for technical uses.

● CORD SETS need not be turned in now to buy a new one. Order L-277 as amended now covers cord sets instead of L-65. Instead of a quota based on percentage of former production, manufacturers will be authorized to make a certain number per quarter. Cord is limited to 6 ft. length. An AA-5 is required from distributors.

● COPPER is only to be used in lighting fixtures where quantities are small and its use does not impede the war effort. Manpower makes copper short still. Some aluminum may be permitted used soon.

● RESIDENTIAL LIGHTING FIXTURES were moved under MPR 188 by a rearrangement of price regulation coverages by OPA. Flashlights and batteries are in the same regulation now also.

● RADIO SUPPLIES for civilians are not likely to be more plentiful for this year out because of increased military requirements.

● CONSTRUCTION order L-41 was amplified by definitions. Interpretation defines construction as including "the installation of any piece of equipment, or fixture for which a base or foundation must be built . . . cemented to a floor, wall or a building . . . or which involves putting new wiring in a building." Exempted is installation which only requires connection to an existing wiring outlet. Where construction is involved permission to begin must be obtained.

● PRISONER-OF-WAR HOUSING, under L-41, does not require permission from WPB if priorities assistance has been granted by the Army.

● HOSPITALS for veterans of the war will be the major construction during the next year. Under the Veterans Administration, 16,000 additional beds are to be provided for in 20 states. High labor priorities will be assigned the construction of such hospitals.

● PRIVATE CONSTRUCTION under authorized war housing orders is still holding its own but military and public construction is declining materially. Because of the tight position of lumber, total construction for the year will only be 46% of 1943 and 27% of 1942 volume.

● WATT-HOUR METERS are to be made again under authorization from WPB. Manufacture was stopped altogether recently by L-151.

● POLES AND TRANSFORMERS are short, and no liberalization of line construction under U-1 is to be expected. Whether materials will be permitted for more generating equipment is still in debate. Department of Interior implies that manufacturers are asking that orders on projects deferred be reopened.

● SURPLUS GOVERNMENT MATERIALS and machines were the talk of the nation during the past month. War surpluses of electrical equipment usable by utilities, contractors, industrials were being released through government disposal agencies. Only source of light trucks may be war returned equipment, since ODT is not accepting applications for new trucks.

● ARMORED ELECTRICAL CABLE of three types, inadvertently omitted from an original listing, have been added to the list of manufacturers' dollars-and-cents ceilings, the OPA announced recently. These included armored leaded cable, bare armored ground wire and bare armored ground wire stranded.

● RADIO TUBES were also given a specific dollars-and-cents wholesale and retail ceiling price. This applies to tubes for civilian radios and phonographs. The order was dated May 20, 1944, reflecting the prevailing prices during March 1942. Abuses of the prices brought about by the scarcity of tubes made the order necessary. OPA's action also specified maximum service charges for testing radio receiver tubes when brought to a shop. No charge is to be made for simple testing of tubes brought to the shop, since no charge was previously made. However, if a radio set is brought to the shop to have its tubes tested a service charge of 50 cents is allowed for removing the tubes, or $1 for removing other equipment to get at the tubes.

● CONTRACT TERMINATION procedure has also been set up for settlement of claims under fixed-price subcontracts. The joint contract termination board is developing this procedure. More of this is expected in the forthcoming months as the needs of the military campaigns shift and, likewise, as the supply of equipment for the armed forces reaches a peak.

● MANPOWER continued to be the most critical of all war problems on the home front. Local manpower committees were given jurisdiction over the hiring of male workers for utilities after July 1. From that date all hiring of male workers will be through the United States Employment Service, or through an agency approved by USES such as a union. Employment ceilings in effect in twenty-five cities will be extended to all Group 1 and 2 labor areas. Ceilings have been set and employment frozen at current levels by local committees.

● DISCHARGED VETERANS at the rate of approximately 70,000 per month are becoming available and a procedure is being worked out by the various agencies to place them. Honorably discharged veterans retain the right to their old jobs if they want and apply for them, a right to medical care and attention, vocational rehabilitation training and a right to assistance in obtaining a new job. Interesting sidelight is that WPB has set up a procedure by which discharged veterans wishing to re-establish themselves in the radio repair business may be given ratings with which to try to obtain necessary parts and tools.

ELECTRICAL WEST

McGRAW-HILL COMPANY OF CALIFORNIA
68 POST ST. SAN FRANCISCO 4

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Federal Water Development

IN the last ten years the federal government has become the most important factor in the development and utilization of water resources. Its activities have brought into sharp conflict the rights and interests of the individual states and of private enterprise in this field. Furthermore, in the postwar era, the beneficial use of the ground and surface waters of the U. S. promises to be one of the most vital political, social and economic problems confronting the nation. This is particularly true here in the Far West where water is such an important item in the over-all economy.

For these reasons the 10-point platform adopted by the U. S. Chamber of Commerce at the behest of its national resources development committee is especially significant. This platform is something to which private industry and the state governments here in the West can heartily subscribe. Its specific declarations are something toward which the region can work. Here, briefly, are the ten specific planks:

1. Advocacy of legislative policies respecting the development of water resources which will afford full opportunity for private enterprise, both to participate in such development and to purchase and resell products, goods or services, including power, that result from water-use and water-control projects developed by government.

2. Recommendation that any government sale of products, that are also manufactured and of products sold by citizens, should be at prices sufficient to cover all costs and the same burden of taxes as citizens pay.

3. Recommendation that the Congress regain the control of the development of water resources that it has lost to administrative agencies, and that it maintain and perfect its authority over future public works.

4. Recommendation that all projects under consideration be re-estimated in the light of the greatly increased construction costs that now prevail, and which can be expected to go even higher after the war to make sure that (a) the cost estimates are reasonably correct; (b) the probable benefits are necessary and desirable in the light of the re-estimates, and (c) the projects will accomplish the declared purpose.

5. Recommendation that no project—especially flood control—be undertaken without careful consideration of its relation to other projects, and its effect on other lines of endeavor.

6. Recommendation that all hydro power developed, whether by private or public agencies, should participate in regional power pools. On this basis all government by-product power should be sold, as such, at the point of production.

7. Espousal of a program of development wherein the purpose or purposes of each project, especially multi-purpose projects, are clear and declared in advance, and cannot be lost subsequently through diversions and changes without the consent of Congress.

8. Recommendation that the interests and rights of the states in water utilization and control be recognized by Congress; that Congress do not use the commerce clause or other authority to limit water uses as established by the states, and that where more than one state on the same stream is involved the division of water be made by interstate compact.

9. Recommendation that every so-called regional plan be examined with great care because of the obvious social and political problems involved to the end that traditional state lines be not scrapped.

10. Espousal of the development of the water resources of the nation for the greatest benefit of the nation as a whole and to the people in the territory in which they are located, upon sound, constructive and forward-looking engineering and economic policies free of politics and on a non-partisan basis.

Substitution of this platform for the policies of the last decade would restore confidence and re-establish faith in the ultimate aims of the federal authorities with respect to water utilization.

Save and Salvage Paper

PAPER in many forms and uses is vital to the continued operation of the electrical industry. But it is even more important to the war. Paper saving and paper salvage should be an important function in every organization in the industry. Here are fourteen paper-saving possibilities that can be applied to any business:

In correspondence: (1) Have carbons typed on the backs of letters. This avoids loss of carbons, saves file space, and saves paper. (2) Have old letterheads and other stock used on one side padded for use as scratch pads, memos, interoffice notes, etc. (3) Reduce typing margins; eliminate double-spaced replies. (4) Use half-size letterhead and small envelopes for short letters. (5) Stop acknowledging acknowledgments—study has shown that half or more of business correspondence is unnecessary. (6) Be brief—think before you dictate—and save time and paper. (7) Scrap obsolete forms; reduce forms; and reduce carbons. (8) Use postcards when they will do the job.

In office routine: (9) Prune files, scrap obsolete catalogues, booklets, bulletins, clippings, old magazines, etc. (10) Clip wanted material from technical or business magazines and salvage the

rest and the space they take. (11) Don't crumple or tear up direct mail or used office paper—assemble and salvage it. (12) Suggest or provide containers for used paper, and salvage newspapers, bags, cartons and containers.

In drafting rooms: (13) Ferret out and salvage obsolete catalogues and "dead" files. (14) Salvage obsolete blueprints and specifications.

Remember this—*the paper you save today fights tomorrow.*

Future of the Heat Pump

BEFORE going completely overboard in its enthusiasm over the heat pump as a substantial central station load (and certainly this device offers great opportunities) the industry might well consider a few fundamental facts. The heat pump or reverse-cycle refrigeration heater simply takes heat from one source and discharges it at another. It is analogous to a conveyor system that would tap a free coal pile outside a building with the operator only paying for the energy to run the conveyor. In the case of the heat pump, the outside source of heat is either air or water.

However, the final determination as to the applicability of the equipment in any given territory is based upon the question—where is the source of waste heat that is to be tapped? If outside air temperatures drop below 28° F., the evaporator ices up. Well water is an ideal source of heat in almost any territory, but is every home to have one or more wells under the house or in the yard?

In short, the determining factor in the success or failure of the heat pump is the source of waste heat. When that question is solved for a particular section of the country, then the heat pump becomes a valuable power company load and a profitable item of equipment for other branches of the industry.

Plight of the Safety Engineer

THE lot of the safety engineer is an unthankful one and his path is seldom strewn with roses. But his job and his responsibility are extremely important. The saving of lives, of lost time and of money which he accomplishes through accident prevention represents valuable contribution to industry. However, even a cursory study of the available accident statistics will show that he has a long way to go before his work is finished.

Take the electric utility business as an example. In the report of the accident prevention committee at the recent EEI meeting it was brought out that while shock and burns account for 72% of all accidents, there had been little decrease in the rate or the proportion of these accidents in the past 20 years.

In searching for remedies, the committee came forward with certain definite conclusions. It asserted that an increasingly smaller gain in safety will be derived from improved plant and structure design, and from improvements in equipment. The committee believed that future major gains in accident prevention will come from increased emphasis on job training, personnel selection and putting responsibility for each accident where it rightly belongs. It pointed out that safety rules exist in practically all companies, but they are not properly enforced. Finally the committee concluded that top management is not sufficiently effective in expressing its interest in accident prevention.

ACCOMPLISHMENTS on the battle lines abroad—and on the production lines at home—have demonstrated that the American people, when aroused, possess the ability and determination to meet and conquer the problems which confront them, even though our democratic processes may at times appear inefficient and unwieldly. The power of accomplishment—though sometimes only latent—is inherent in our people, and springs from the character of our ancestor pioneers, who, through their determination, hard work and sacrifice, transformed a wilderness into a great nation. The heritage which we enjoy today is the result of their determination not only to provide what they required for themselves, but to build and pass on for future generations a system of government—and relationships between people—which are the landmarks of our democracy . . . The problems of war are being solved by our military leaders and fighting men backed by the forces of American industry. When peace comes, there will follow the equally difficult problem of establishing a peacetime production, and the resulting exchange of goods and services, sufficient to provide profitable employment for our people and to develop a national income adequate to maintain the solvency of our country. Before real progress can be made in this program, it is essential that we establish improved relationships between government and business, capital and labor, and agriculture and industry. For a century and a half, each American generation has passed on to its successors a higher standard of life and more independent security than ever before enjoyed. It is the job of Americans everywhere to insure that this march of progress continues.—C. J. Strike, president, Idaho Power Company.

PCEA Panorama

Edited by Mary Shoop

Appointments Made

Section and committee chairmen are named

CHAIRMEN of PCEA's sections and committees have been selected for the new year. They are:

Operating Economics Section—chairman, E. W. Morris, Westinghouse Electric and Mfg. Co., Los Angeles; vice-chairman, C. E. Baugh, Pacific Gas and Electric Co., San Francisco.

Administrative Services Section—chairman William de Waard, San Diego Gas and Electric Co., vice-chairman, S. F. Maughmer, General Electric Co., San Francisco.

Business Development Section—chairman, Milo Cain, Coast Counties Gas & Electric Co., Santa Cruz; vice-chairman, H. C. Rice, Southern California Edison Co., Los Angeles.

Adequate wiring committee—chairman, J. A. Hill, PG and E, San Francisco; vice-chairman, W. L. Stickel, Leo J. Meyberg Co., Los Angeles.

Code and ordinance committee—chairman, B. C. Hill, City of Oakland; vice-chairman, M. G. Sues, Leo J. Meyberg Co., Los Angeles.

Planning committee—chairman, R. E. Fisher, PG and E, San Francisco.

Distribution lines committee—chairman, S. J. Lisberger, PG and E, San Francisco.

Industry information committee—chairman, R. G. Kenyon, Southern California Edison Co., Los Angeles.

Membership committee—chairman, S. W. Scarfe, General Electric So., Los Angeles; vice-chairman, E. A. Long, PG and E, San Francisco.

Highway lighting committee—chairman, I. W. Borda, The Okonite Co., San Francisco; technical sub-committee, chairman, G. H. P. Dellmann, San Diego Gas and Electric Co.

Budget and finance committee—chairman, C. E. Houston, Southern California Edison Co., Los Angeles.

Resolutions committee—chairman, G. C. Tenney, ELECTRICAL WEST, San Francisco.

Publicity committee—chairman, A. X. Schilling, General Electric Co., Los Angeles; vice-chairman, Robert R. Gros, PG and E, San Francisco.

Handbook revision committee—industrial power and heating, chairman, A. L. Laws, Southern California Edison Co., Vernon; agricultural, chairman, Lyle W. Smith, PG and E, San Francisco.

Who Am I?

I was born in Stockton, Calif., in 1890. After receiving my grammar and high school education there, I attended the University of California, where I majored in electrical engineering and received my B.S. degree in 1913. My first job was with a general contracting firm on reinforced concrete dam construction. From 1914 to 1917, I was an engineer with the Railroad Commission of the State of California. Who am I?

Service in the Army for the next two years took me overseas with the 5th Engineers. I entered service as a first lieutenant and later became a captain. After the war, I returned to the Railroad Commission in valuation and rate work with both gas and electric utilities. From 1927 to 1929, I was gas and electric engineer for the commission. I joined the Coast Counties Gas and Electric Co. in November, 1929, as chief engineer, the position I still hold. Who am I?

I have been a member of PCEA for more than 15 years. I have served on many committees and at present am a director of the association. I am a member of the Elks, Sigma Chi Fraternity, am a past councilor of the University of California Alumni Assn. and a past director and treasurer of Associated Sportsmen of California. My hobbies are hunting, particularly duck shooting; and fishing. I am married, reside in Santa Cruz, and my name is:

See page 105.

More Home Planning

Plans are under way to hold a series of home planning institutes in Northern California. At a meeting in San Francisco June 28, the idea was adopted unanimously, and a committee is now at work organizing a speaker's bureau and making other necessary arrangements.

Sponsors include the State Association of California Architects, American Society of Heating and Ventilating Engineers, Associated Home Builders of San Francisco, California Bankers Assn., California Savings and Loan League, California Retail Furniture Dealers Assn., Northern California Plumbing and Heating Wholesalers Assn., Northern California Electric Bureau, Pacific Coast Gas Assn., Pacific Gas and Electric Co., Pacific Coast Electrical Assn., California Association of Nurserymen, Golden Gate Paint Oil and Varnish Club, California Land Title Assn., and the Coast Counties Gas and Electric Co.

Whittier, Too

Whittier has extended its home planning institute to make it of even more value to the public. It began May 12 and is scheduled to close Sept. 18.

The regular institute meets every other Monday night. On the alternate weeks, work shop sessions are held under the direction of local architects. Its purpose is to help the prospective home owner organize his ideas, get them over to the architect clearly, and read plans so that he may know in advance exactly what his home will be like.

Blueprint reading, layout, design and related subjects are taken up at these extra sessions. Those attending work out various problems and submit them to the constructive criticism of the architect.

An attendance of around 50 was expected at the workshop meetings. The actual number is around 150, and it was necessary to divide the class to keep it small enough for project work. The work shops are now in session on Monday and Tuesday nights of the weeks in which the regular institute session is not held.

Officials Start Work

The new PCEA administration is hard at work. The board of directors held a meeting at San Diego Aug. 9. During the first week in August, the northern members of the code and ordinance committee met under the chairmanship of B. C. Hill to determine if there were any recommendations that should be brought up before the annual convention of the southwestern section of the Electrical Inspectors Assn., to be held in Santa Cruz Aug. 28, 29, 30.

Chairman Milo Cain of the Business Development Section met with northern members of the section's guidance committee the fore part of August to begin plans for the fall conference.

The lamp that has more and more friends!

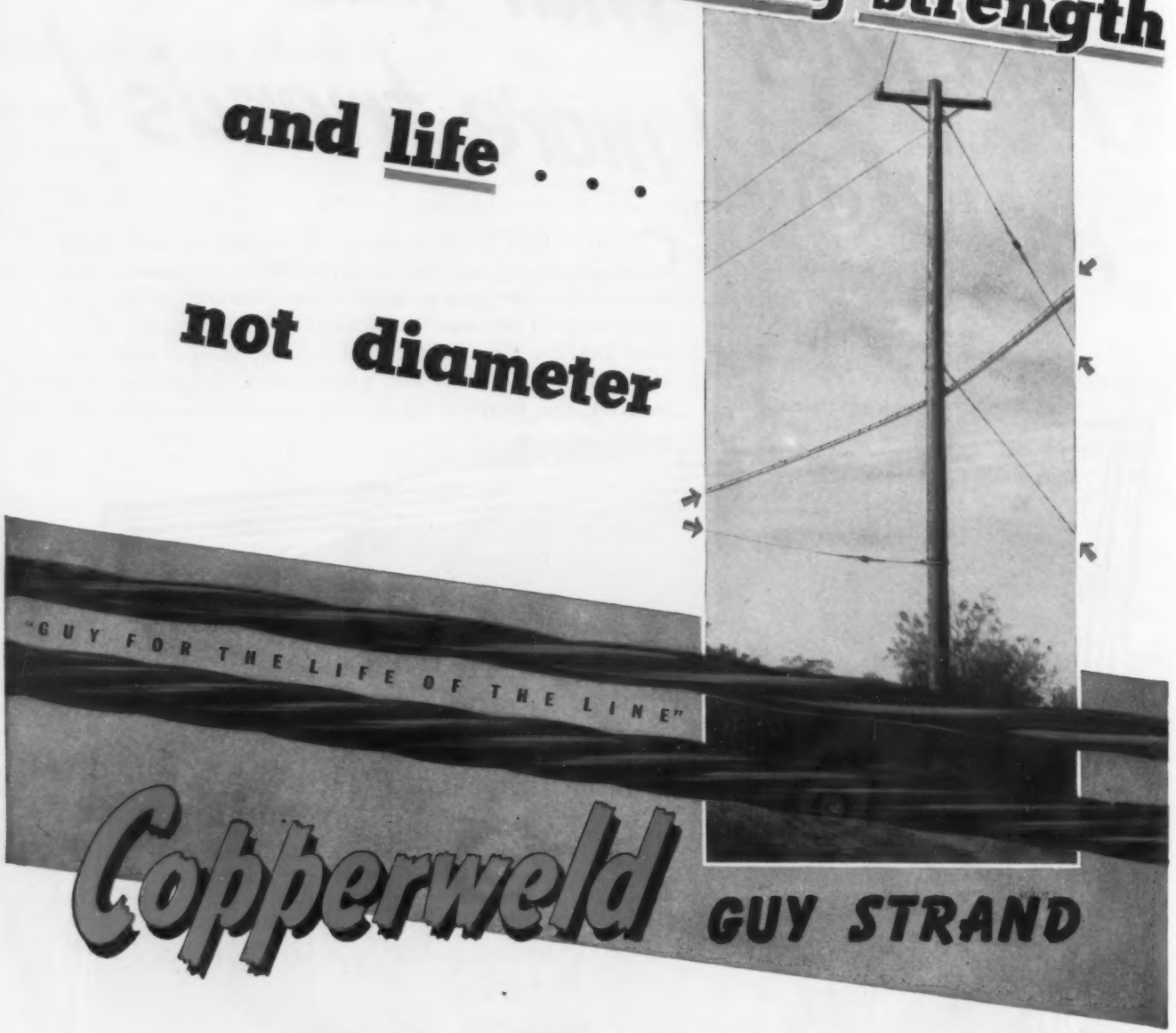
COME POSTWAR, millions of Americans will again go shopping and buying. And just as happens everywhere today, they will look for recognized quality they can depend on. They *know* the famous G-E monogram. They *know* that the mark of General Electric assures them the utmost in high quality and performance. In the postwar markets, that fact will again help you increase sales and profits.

Hear the General Electric radio programs: "The G-E All-Girl Orchestra" Sunday 10 p. m. EWT, NBC; "The World Today" news every weekday 6:45 p. m. EWT, CBS

G-E MAZDA LAMPS

GENERAL ELECTRIC

Buy breaking strength and life . . . not diameter



Copperweld GUY STRAND

It's not diameter *alone* that counts. Select guy strand by BREAKING STRENGTH and LIFE for the job the guy must do.

With Copperweld you don't need to buy oversized guy strand as a protection against later loss of strength caused by rust. Copperweld won't rust; its original high strength is permanent.

You save when you buy smaller diameters and fewer pounds of non-rusting Copperweld—and you save, too, by avoiding costly replacements of rusted strand.

COPPERWELD STEEL COMPANY · GLASSPORT, PA.

Pacific Coast Representative: C. E. INGALLS · RIALTO BUILDING · SAN FRANCISCO, CALIFORNIA

Electriquiz

Charles L. Moore, district manager, Chicago Flexible Shaft Co., Los Angeles, is the author of this interesting quiz.

1. Are high-wattage modern automatic electric irons more expensive to use than old fashioned low-wattage irons?
2. When mother was a girl, her ironing hour had a full round 60 minutes. Modern electric irons have shortened the ironing hour to 40 minutes. What are the four reasons for the speed of the modern iron?
3. Will high speed a-c-d-c series wound brush type motors as used in most domestic food mixers and some electric shavers operate efficiently at correct speeds on either 50 cycle or 60 cycle a-c current?
4. Why is it possible to make better coffee electrically than by any other heating method?
5. What is the answer to the complaint that an electric motor runs too warm?
6. What is one of the possible uses of the electronic tube in modern offices?

See answers on page 112

● PCEA members in military service have been sent a copy of the speech presented at the PCEA conference May 18 in Los Angeles by Lt. Charles H. Faulkner, Inact. Res., U. S. Army, a returned Southern California Edison Co. serviceman. It was the opening event in the Administrative Services Section's day-long consideration of how we at home can be of the greatest assistance to returning servicemen, and contained many points that PCEA members in the service will find interesting.

● Reprints of the PCEA advertisement in the June issue of ELECTRICAL WEST have been sent to all members, including those in the service. Titled *Three of a Kind*, it points out that PCEA's "hand" holds three "aces"—1,700 old members, several hundred new members and numerous members in military service. A membership increase of 5% in 1943 is evidence of the growing realization that a united industry can face the future with better prospects for the individual, the advertisement said.

Electrical installation problems were discussed at the July 26 meeting of the Northern California Chapter IAEI. Speakers were Clifford Prud'homme, Sacramento city electrician, and Nick Siggins, San Francisco electrical inspector.

Contractors' Governor

Northern Calif. NECA Chapter also names manager

CALLED to special meeting to select a "governor" from the Northern California Chapter, National Electrical Contractors Assn., and to pass upon a proposed national advertising plan, electrical contractors from all parts of northern California met in San Francisco, July 14. T. L. Rosenberg, Oakland, president of the chapter, was elected as the governor from that chapter on the board of governors now set up in the NECA organization since its recent change in constitution. J. D. O'Connor, Lupen & Hawley, Sacramento, was elected the alternate.

Rosenberg opened the meeting with a report on the activities of the chapter since its reorganization in January. He told of meetings held by himself, William J. Varley, NECA field representative and W. A. Cyr, secretary of the chapter, in Stockton, Fresno and Bakersfield. He discussed the changes in the NECA constitution and how the process of change had delayed the selection and employment of a full-time manager and representative for the chapter. He reported on the recent meeting of NECA in St. Louis, and the reasoning back of the proposed advertising campaign in national magazines.

A. R. Linn was then introduced as the newly appointed chapter manager. Linn, with a background of trade association and labor and industrial relations experience, is to travel the northern California territory, give assistance to local associations, obtain data and interpretations of governmental orders and directives for members, help to work out uniform labor agreements throughout the territory and will conduct a surplus materials clearinghouse for members.

George Abbett, president of the San Francisco Electrical Contractors Assn., submitted amendments to the chapter bylaws to provide a membership representation basis for election of members of the board of directors. His amendments passed. Each of eleven districts in the area will have a director, elected locally by local members. Districts with more than ten members will be entitled to additional members of the board for each ten members.

The NECA proposed national advertising campaign, which would have cost each member a $50 assessment, was turned down. The proposed annual wage agreement, while agreed to in principle, was held to be premature as far as the manpower situation on the West Coast is concerned. No action was taken in respect to nomination of a vice-president from the West to represent nine Western states, choice being limited to either Grover Burke of Seattle or A. L. Stone of Los Angeles, each member to vote as he pleases without chapter direction.

A meeting in Fresno, June 24, of representatives from both the Los Angeles Chapter and Northern California Chapter, to discuss policy in respect to the changes in the NECA constitution was reported on by Rosenberg, his letter on the subject being given a vote of endorsement at the conclusion of the meeting.

RMEL in Fall

Setting the dates Oct. 2 and 3 for its fall conference in Denver at the Shirley-Savoy Hotel, the Rocky Mountain Electrical League executive committee also set up a revived wiring bureau and authorized an appliance survey throughout its entire region, comprising Colorado, New Mexico, Wyoming and a portion of South Dakota, according to George Lewis, managing director. President C. C. Baker, Colorado Central Power Co., named Pete Kanekeberg, Public Service Co. of Colorado, as head of the program committee for the annual conference.

T. M. Foulk, who has been chairman of the adequate wiring section, was also named by Baker to head the revived Wiring Bureau which will promote the idea of "lifetime wiring" and organize the industry to sell wiring on a bigger scale than before. One of the original "Red Seal Wiring" promotion agencies, the league is expected to carry a strong program in this respect.

Ray Jones, chairman of the dealer division of the league, was authorized to proceed with a region-wide survey of home appliance needs, getting the participation of all utility member companies. Urgency of the survey is felt because of the need to acquaint manufacturers with the need and demand in the region and thus assure distribution of available merchandise to the Rocky Mountain region in proper relation to other more populous areas.

A county ordinance to require inspection for the installation of electrical work of all classes in public buildings, theaters, homes, etc., in both the incorporated and unincorporated areas of San Diego County was urged to that county's Board of Supervisors by the San Diego Chapter, National Electrical Contractors Assn. V. T. Heinz, secretary-treasurer, made the presentation to the supervisors giving reasons for such inspection for the safety of the public and for more workmanlike installation. The chapter continues its regular meetings each two weeks at its own hall.

Inspectors to Concentrate on Code

Programs of both Northwestern and Southwestern sections IAEI eliminate speeches for Code talk

WITH a new National Electrical Code to fabricate out of the ruins of the 1940 edition, the war, interim amendments, the 1937 wire tables and the substitutes developed for no-longer-available materials, this year's meetings of the sections of the International Association of Electrical Inspectors will be important for years to come. Code changes will take the major part of program time and thought, with few speakers this year to bring industry messages. They will definitely be hard working meetings, something not new to inspector conventions, but more than ordinarily so this year, fully justifying the transportation required to reach them by the participants. A new Code to be prepared for the reconversion of wartime industry to peacetime and civilian production will prevent the risk of hazards due to confusion over permanent installation using wartime expedient temporary methods.

Northwestern Section, IAEI will gather for its 18th annual meeting in Olympia, Wash., Aug. 21, with headquarters at the Olympian Hotel. J. Hyde Stayner, Utah Power & Light Co., president, will preside.

From the addresses of welcome by Arthur B. Langley, governor of the State of Washington, J. T. Trullinger, mayor of Olympia, and A. M. Chitty, manager of the southwestern district of Puget Sound Power & Light Co., through the last article committee report, the meeting is packed with suggested Code revisions. To pack it to overflowing, there will be two Code breakfasts on Tuesday and Wednesday, chairmanned by Homer A. Morton, The Montana Power Co., and W. L. Gaffney, chief electrical inspector, Tacoma.

Special committee report of considerable interest will be that of Capt. Stephen E. Sanislo's public relations committee activity in sponsoring the Electrical Safety Week in the state of Washington, and the Captain's plan for making it a Northwestern Section territory activity in 1945.

Several of the IAEI postwar committees are ready to report at the section meeting, among them A. M. McLean on *Uniform Codes*, J. Hyde Stayner and F. H. Murphy on *Increased Load on Inadequate Installations*; I. B. Sturges on *sales control* and on *reinspection*; and E. B. Morrison, *development of the IAEI*.

Taking very seriously the wartime restrictions on all meetings unless urgently necessary, the Southwestern Section, International Association of Electrical Inspectors has really concentrated its entire program for the annual meeting, Aug. 28, 29, 30 at Santa Cruz, Calif., upon the serious business of revising the National Electrical Code. Except for a recess Tuesday afternoon, during which attendants may enjoy the beach, go fishing or hike into the nearby hills for diversion, there is no entertainment planned. Instead the meetings will be devoted almost entirely to reports of article committees and discussions of proposed revisions of the Code.

The only two talks before the general meeting will be given on Tuesday and Wednesday mornings. Joseph J. Siddall, electrical engineer, H. H. Robertson Co., Pittsburgh, will open the Tuesday morning session with a short talk on *Peacetime Materials in Postwar Plans*. On Wednesday morning, Roy R. Cowles, electrical engineer, Pacific Gas and Electric Co., San Francisco, is scheduled to open the meeting with a talk on *Overcurrent Protection of Motor Circuits*. The only other talk will be that given at the luncheon meeting on Monday at Hotel St. George. Robert B. Shepard, chief electrical engineer, Underwriters' Laboratories, Inc., New York City, will give a postwar planning committee report on *The Investigation of Substitute Materials and Metals*.

The meetings will be presided over by N. J. Siggins, electrical inspector of San Francisco and president of the southwestern section. After preliminary introduction of guests, visiting national officers such as James D. Lynett, president of IAEI, supervising chief inspector, City of New York, Victor H. Tousley, secretary-treasurer, IAEI and other committee and chapter reports, the members will pitch into the various articles of the Code in rotation. Secretary-Treasurer Gerber has made on analysis of all the proposed changes published by the IAEI and others submitted to the section and has distributed these to chairmen of the various article committees. Reports from these chairmen on the material submitted and any suggestions they may have made for revision themselves will be digested by the Code clearinghouse committee and submitted for discussion to the entire membership. This is expected to occupy the entire time of the annual meeting.

Two of the usual and popular Code breakfasts will be held on Tuesday and Wednesday mornings at 7:30 a.m. at Hotel Palomar. These will be under the chairmanship of B. C. Hill, superintendent of electrical department, Oakland, and Harry V. Dobson, city electrician, Santa Barbara, respectively. The meetings themselves will be held in the civic auditorium at Santa Cruz. There will be one evening dinner Tuesday but no dance is scheduled. An exhibit of electrical equipment will be conducted at the Civic Auditorium adjacent to the meeting room.

IES Elections

New officers elected through the recent general ballot of the Illuminating Engineering Society have been announced. Sam B. Williams, editor, *Electrical World*, New York, is the new president; L. E. Taylor, Detroit Edison Co., general secretary; James M. Ketch, General Electric Co., Nela Park, treasurer; and G. K. Hardacre, Public Service Co. of Northern Illinois, Chicago, vice-president.

Of interest in the West is the election of regional vice-presidents and chapter and section officers. C. T. Bakeman, Puget Sound Power and Light Co., Seattle, and George M. Rankin, Southern California Edison Co. Ltd., Los Angeles, are the two western regional vice-presidents.

For the Northern California Section, Robert L. Dearborn, Kaiser Co., Inc., Oakland, is chairman; L. M. K. Boelter, University of California, Berkeley, vice-chairman; H. H. Robison, Pacific Gas and Electric Co., Oakland, secretary; and a board of managers consisting of W. E. Carlson, Robert G. Dummel, Romaine W. Myers (retiring chairman), and G. A. Trosper.

For the Southern California Section, R. J. Crump, Graybar Electric Co., Los Angeles, chairman; L. W. Luley, Westinghouse Electric Mfg. Co., Los Angeles, secretary; and a board of managers consisting of C. D. Gibson, D. J. Grandey, H. L. Hruby, T. H. Shepherd (retiring chairman) and W. F. Straker.

In this same election the title Northern California Section, as a substitute for the name San Francisco Bay Cities Section, was approved. The constitutional changes which had been submitted to the membership were likewise all carried. These establish a new grade of membership of a fellow and likewise increase the annual membership dues.

STOP! GO! AHEAD WITH Lloyd New Automatic Starter

In the New RED PLASTIC Can

Ⓤ Submitted to Underwriters' Laboratories Inc., for approval.

ETL Submitted to Electrical Testing Laboratories, Inc., for certification.

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Locks Out . . . Resets AUTOMATICALLY

NEW AND DIFFERENT. The most effective starter yet produced. Outstanding contribution to effective operation of fluorescent lamps.

1. Positively cuts out deactivated, flickering, blinking lamps.
2. When trouble is detected the starter automatically cuts off current to the ballast and lamp.
3. Gives long life to ballast because defective lamp is locked out. Prevents overheating.
4. When Lloyd AUTOMATIC locks out defective lamp —turn off the current—Remove defective lamp— Put in a new lamp.
   Allow at least one minute to make the above change of lamps. Turn on current. The starter automatically lights the new lamp.
   NO NEED TO DO ANYTHING TO THE STARTER
5. Lloyd NEW PLASTIC CAN has higher dielectric strength, is stronger, lighter, distinctive.
6. Knurled rim on plastic can insures positive grip for insertion and removal of starter.
7. Plastic can is sealed. No projecting lugs to cause trouble.
8. The life of the AUTOMATIC starter is many times greater than that of the average lamp.
9. It saves maintenance costs and power consumption. protects and insures longer life to the ballast and lamp.
10. Tested in production and prior to shipments to insure perfect performance.

Dept. EW-8

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NEWS of the industry

WASHINGTON PUD AGAIN NAMES MYERS AS AGENT

Guy C. Myers of New York has again been named fiscal agent by the Clark County (Wash.) PUD in its attempt to acquire properties of Northwestern Electric, Pacific Power & Light and Portland General Electric companies within its boundaries.

In announcing the appointment last month, the PUD stated its intention to proceed with condemnation proceedings immediately, although instructions to Myers were to get the properties by purchase rather than by condemnation, if possible.

A contract with Myers was cancelled three years ago, when negotiations between the PUD and the utilities were terminated. According to Heye H. Meyer, chairman of the PUD board, the new contract with the New York agent differs in several particulars, including a lower rate of fee and the fact that he will serve as financial advisor only and will have no part in engineering details.

Under the new contract, if Myers is successful in securing the properties at a price agreed upon by the PUD commission, its engineering representatives and Myers, he will be paid 1% of the purchase price. If he is able to get the properties for less than the agreed sum, he will receive a bonus of one-half per cent of the amount saved. If the purchase price is higher than the offering figure, Myers will be penalized one-half per cent of the amount above the survey price.

Commenting in his July 1 letter to stockholders on the PUD's announced intention of hiring eastern engineers and bond attorneys preliminary to condemnation proceedings, L. T. Merwin, Northwestern Electric Co. president, declared:

"This proposed diversion of large amounts of taxpayers' and public funds, to hire eastern engineers and attorneys for such purposes, plus the heavy expenditures of the time and efforts of manpower now engaged in wartime efforts, as will be involved in any such proceedings, will shock the common sense and the conscience of the great majority of our citizens, who believe that all resources and efforts should be concentrated on winning the war. It remains to be seen what the citizens and taxpayers of Clark County, relatively defenseless as they are under the PUD law against such political adventures with the public purse, will be able to do to protect themselves against this program, which, among other things, would take large additional amounts of property off the tax rolls.

"The stockholders of this company may rest assured, however, that no effort will be neglected by the management to protect the interests of the company and its investors, in the event that the PUD persists in its announced intention to take over the properties and business of the company in Clark County. "

SEC Turns Down Pepco Reorganization Plans

While approving the principle behind Portland Electric Power Co.'s proposed reorganization, SEC has rejected each of the four plans submitted. In disapproving the plans, the commission suggested its own outline and allowed 60 days for filing amended plans. If no further proposals are filed, SEC will have authority to submit its own plan to the court.

The four plans, each based on distribution of assets to the company's security holders in accordance with rights and priorities of the securities, were submitted by the Pepco trustees, a committee representing prior preference stock, a bondholders' committee and Guaranty Trust Co. of New York, indebenture trustee for the company's defaulted income bonds. The first two plans were declared unfair to bondholders and the last two to stockholders.

Meanwhile Federal Judge Fee took under advisement an appeal by the Independent trustees for a valuation hearing of Pepco assets as of July 1. The trustees contended that no conclusions were given to justify the $22,275,000 valuation set by SEC as opposed to their own figure of $35,000,000.

Further complications arise from the fact that, as a holding company, Pepco must have its reorganization approved by SEC but, under the bankruptcy act, jurisdiction belongs to the federal court.

● AVAILABLE from the Bonneville Power Administration at Portland are job possibility surveys for six Oregon counties. The surveys which cover Wasco, Coos, Tillamook, Douglas, Klamath and Clatsop counties, show opportunities for 24,660 new jobs in private enterprise. Utilization of the forests for wood products, fibers and chemicals leads the list, with farming next. A phosphate fertilizer plant and an electro-process plant at The Dalles and an electric steel furnace at Klamath Falls are among suggestions contained in the surveys.

CVP WATER CONTROL IS ARGUED AT HEARINGS

U. S. Senate subcommittee hearings on the proposal to limit irrigation waters from California's Central Valley Project to holdings of 160 acres or less were held on the West Coast last month.

Senator Sheridan Downey (D) of California presided over the sessions, which closed without producing the hoped for compromise in the bitter dispute evoked by the CVP water control and soldier resettlement plan sponsored by Interior Secretary Harold Ickes. Downey is opposing the Hatch bill which has been proposed to put teeth in the limitation plan.

Proponents of the plan, including the state grange, indicated that they were out to stop the "feudal" type of farming in California. Opponents dubbed the limitation proposal a direct approach to land socialization.

Opposed to the plan are the California State Water Authority, The California Irrigation Assn., the California Farm Bureau Federation and other farm groups, with a combined membership in excess of 25,000.

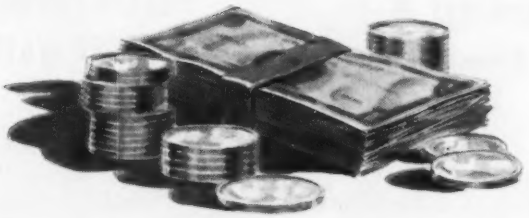
Reclamation Commissioner H. W. Bashore, in the West for the hearings, termed the Hatch bill a "starting point," not a solution and warned that lifting of the 160-acre water restriction would make the state ineligible to receive federal funds for further reclamation work.

Shasta Plant Now Delivering Power into PG and E System

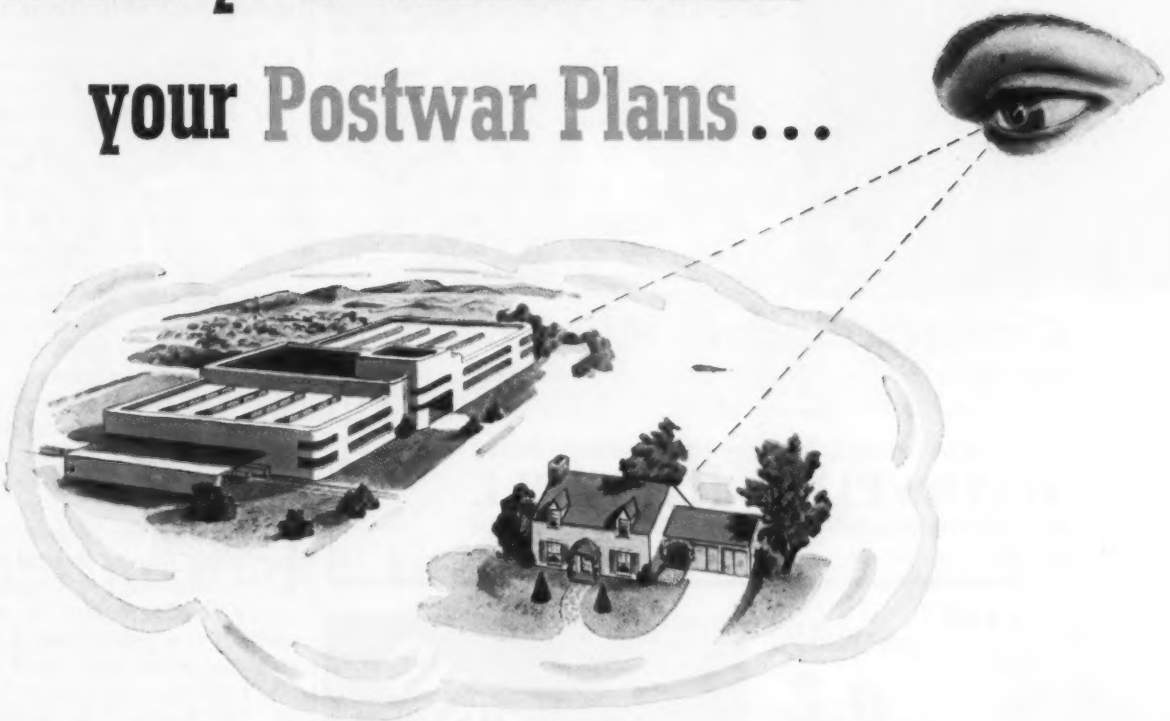
Operation of Shasta power plant was started officially on July 14, although delivery of power from the two initial 150,000-kw. units actually was started late in June.

Under contract with the Bureau of Reclamation, Pacific Gas and Electric Co. will take the wartime output of the dam. Final step in delivery of the power to the company was taken July 24, when the government's Shasta-Oroville transmission line was placed in operation. The line has been leased to the company for $75,000 a year.

During 1944, PG and E will take as much of the Shasta power output as it can absorb, which probably will be all that can be produced. Beginning Jan. 1, 1945, the utility will buy at least 800,000,000 kwh. annually.



When your banker scans your Postwar Plans...



Will inadequate wiring suggest early obsolescence?

• Poor roofing and plumbing are obvious features that label a property a "bad risk" for financing. Inadequate wiring, although not always so obvious, counts for even more.

Naturally you want to guard against early obsolescence—whether it's a home or a factory. And of course you want to be able to take full advantage of all the electrical possibilities ahead... from finger-tip home conveniences to latest power devices for efficient manufacturing. For either or both – adequate electrical wiring must come first.

Make *sure* of expansion capacity—peak efficiency from electrical circuits, service equipment. Now is the time to bring these important factors into the planning stage: your consulting engineer, electrical contractor, utility power engineer.

Unwired planning will cost you a lot more than planned wiring. 44242

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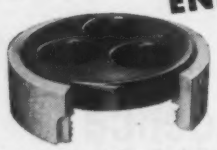
CONDUIT TYPE END FITTINGS ...by O.Z.



This Type "E" End Fitting is designed especially for ends of conduit. The body is of malleable iron, cadmium plated; the cover is of molded canvas Bakelite having high dielectric and mechanical strength. Standard holes in the cover provide for spacing and insulating the wires individually as they open up from the conduit end. Covers can be drilled for any number of holes. Types for threaded or threadless conduit, also a grounded type.

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The new O. Z. Catalog No. 125 lists the complete line of electrical fittings with detailed specifications, photo diagrams and prices. It includes Conduit Fittings . . . Cable Terminators . . . Junction Boxes . . . Solderless Connectors . . . Power Connectors . . . Grounding Devices. A request on your letterhead will get your copy.

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STATE OPERATION OF CVP BEFORE WATER AUTHORITY

Preliminary study of the possibility of state operation of the Central Valley Project was ordered by the California Water Project Authority, following a recent hearing in Sacramento.

State Engineer Edward Hyatt was instructed to prepare a report on the probable costs of a complete review of the issue and feasibility of state management of the project .

Charges that Secretary Ickes and U. S. Bureau of Reclamation are using the Central Valley Project "as a weapon of coercion to impose upon our people a program of social changes developed and fostered by bureaucrats in Washington," were made by Roland Curran, secretary-manager of the Central Valley Project Assn., who declared that, while the project was conceived as an irrigation undertaking, construction of the irrigation units has been prosecuted with little diligence. California's attorney general, Robert W. Kenny, a member of the Water Project Authority, attributed the delays to the fact that "a war is on and needed materials have been diverted to war industries."

Control of the project now rests in the hands of the federal government and to relinquish that control to California would require an act of Congress. It was pointed out that, while the state ten years ago voted a 170,000,000 bond issue to finance construction of the project, a relatively small amount of the money has been expended. Of the nearly 160,000,000 spent to date, about $133,000,000 has been supplied by the government.

● EXPENDITURE of $75,000 to continue engineering studies of undeveloped power resources of Owens Gorge in Inyo County, Calif. was authorized last month by the Los Angeles Board of Water & Power Commissioners. Studies will be made of most efficient locations for power plants, penstocks and surge chambers.

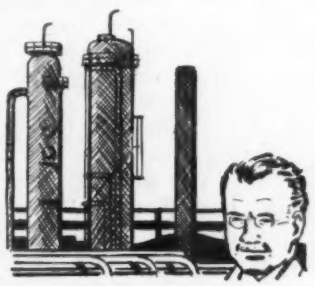
● PACIFIC GAS AND ELECTRIC CO. expects to save 216,000 barrels of fuel oil by maximum use of gas in its steam generating plants during the last quarter of 1944. Additional pipe lines are being laid at a cost of approximately $2,000,000.

● IDAHO POWER CO.'s acquisition of electric power facilities serving Sun Valley, Idaho, from the West Coast Power Co. of Portland, has been approved by the Oregon Public Utilities Commission, it was announced recently.

Can you make turbine oil in a teakettle?

You might be able to make a lubricating oil from crude oil with only a teakettle. And you might put this oil in a turbine. However, there's just one little catch to this method...

Oil that's been given a "short cut" processing isn't stable. It breaks down quickly, forms sludge and corrosive acids. Actually, the manufacture of a turbine oil *that will really safeguard your equipment* takes a great deal of "know how" and special equipment.



Unacal Turbine Oil is processed in special refining equipment to the point where it is just about as stable as an oil *can* be. Consequently it is *tough,* won't break down, stays on the job, protects high-speed bearings and other moving parts against wear.

Try Unacal Turbine Oil. It comes in four viscosity grades—one of which will do your particular job exactly right. You can get a supply by simply calling your Union Oil Resident Manager.

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Success-Tested Product

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is our business!

Whether we furnish Lighting Equipment for a factory or institution, or design and fabricate the Lighting and Stage Switchboard for a theatre, our job is harnessing electrical candlepower for maximum lighting efficiency.

Today, we are burning the candle at both ends trying to satisfy Army, Navy and Air Corps requirements for HUB products, such as Marine Switchboards, Stage Switchboards, Footlights, Borderlights, Stage Pockets, Fluorescent Lighting, Flush Light Boxes, Exit and Directional Signs. But where priority requirements permit and materials are available, we are still filling orders for other applications.

Whatever your needs or problems may be in connection with lighting equipment or switchboards, our advice and assistance are yours for the asking. Get in touch with us or our Resident Engineer nearest you.

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JUDGE GRANTS PUD TITLE TO PUGET SOUND HOLDINGS

While a Puget Sound Power & Light Co. appeal from the $600,000 jury valuation on its Clallam County holdings was still pending in the Washington State Supreme Court, Clallam PUD last month was granted title to the properties by decree of Superior Judge H. G. Sutton.

According to Paul Coughlin, Pud attorney, purchase will be financed by a $700,000 bond issue sold to Ballard-Hassett Co. of Des Moines, at an average interest rate of 3.19%.

The $600,000 valuation, about half the figure asked by the utility, was set last December, following condemnation proceedings. Estimates introduced into the hearings by PUD representatives ranged from $390,000 to $425,000.

Idaho Power Bond Issue Gets FPC Authorization

Idaho Power Co. has received FPC authorization to issue 60,587 shares of 4% preferred stock for redemption of outstanding 7% and $6 preferred. The stock will have a $100 par value. The refinancing is expected to result in reduction of $153,304 in annual preferred dividend requirements and, based on an offering price of $102 per share, would yield purchasers a return of 3.92%.

Under the plan, present preferred stockholders were given until July 22 to signify their desire to exchange their stock for the new shares. Stockholders who availed themselves of the exchange will secure a new share of 4% preferred stock and cash in the amount of the difference between the initial offering price of the new shares and the $110 call price of their present stock. Unexchanged shares were to be sold on Aug. 1, to the underwriters at not less than the initial offering price to the existing preferred stockholders.

Sale of Western States Properties Completed

Purchase by California-Pacific Utilities Co. of electric and water properties of Western States Utilities Co. in Winnemucca, Nev., Malad City, Idaho and Cokesville, Wyo. was announced late last month. Purchase price was $534,000, including assumption of $309,000 in outstanding Western States bonds.

Financing was through a new issue of $1,600,000 3½% 25-year bonds, sold at 103, refunding $1,000,000 California-Pacific 4s and $309,000 Western States 4½s.

Other holdings of California-Pacific consist of electric, gas, water and telephone service in several California communities and gas service in several Oregon towns.

Franchise Won in Yakima, Lost at Walla Walla

Voters of Yakima, Wash., granted Pacific Power & Light Co. a 20-year franchise at the primary election on July 11. Without absentee ballots, the count was 3,495 "yes," 2,954 "no."

A similar proposal was rejected in Walla Walla, 2,117 to 1,958. The company had been operating without franchise in both cities, since renewals were defeated a few years ago.

Under the franchise terms, Yakima's street lighting system will be modernized. A 2% gross revenue tax also is provided.

● OFFER of the Pacific Gas and Electric Co. to install transmission lines and deliver electricity to an area in Fresno County, Calif., has been turned down by the Foothill Electric Assn., it was revealed recently, with the announcement that the association will proceed with its own program to provide power to the rural section. The association reportedly has contracted with the federal government for $260,000 in REA funds to construct the project.

● REFUSAL of Washington Water Power Co. to furnish two public utility districts in the state of Washington with rate schedules, has been upheld by the State Supreme Court at Olympia. The schedules were sought by District No. 1 of Okanogan and Douglas counties in connection with condemnation proceedings now filed against the company.

● KITSAP COUNTY Commissioners, Port Orchard, Wash., have granted a 25-year franchise to Kitsap County PUD. The franchise which is to be exercised only in event the PUD decides to establish power service in the county, covers use of right-of-ways along all county roads for the erection of power lines.

● LATEST PROCESSES for welding in aircraft production are shown in a new film prepared by the Navy Department. Although the film is designed for restricted use, it is being exhibited by sections of the American Welding Society and, under certain conditions, is available to others.

Nearly a million miles of Alcoa A.C.S.R. have been bought for rural and hi-lines.

They were years ahead of demand when the war came along

The power companies knew this country was going places. So they built for a grand future. Generating plants, transmission lines and distribution facilities were designed on a scale which would place no limitations on that growth.

Then came the war. The country's demands for electricity soon gobbled up surpluses of generation and distribution. A power famine threatened.

But the utilities saved the day. Not only did they cut into service every ounce of reserve, but they uncovered an ingenuity which made heavy producers out of middleweight equipment. Generators, transformers, switching apparatus, all have been overloaded to the point of exhaustion, cancelling much from their life expectancy, but carrying the country over the hump.

Power lines and underground cables have been loaded to suit the weather, running hotter on cool days, when excess heat could be dissipated. Substitute materials and makeshift methods were employed, just as in other industries, to patch up and extend vital lines. Critical materials were saved for war.

So, hats off to the public utilities! They've done a marvelous job.

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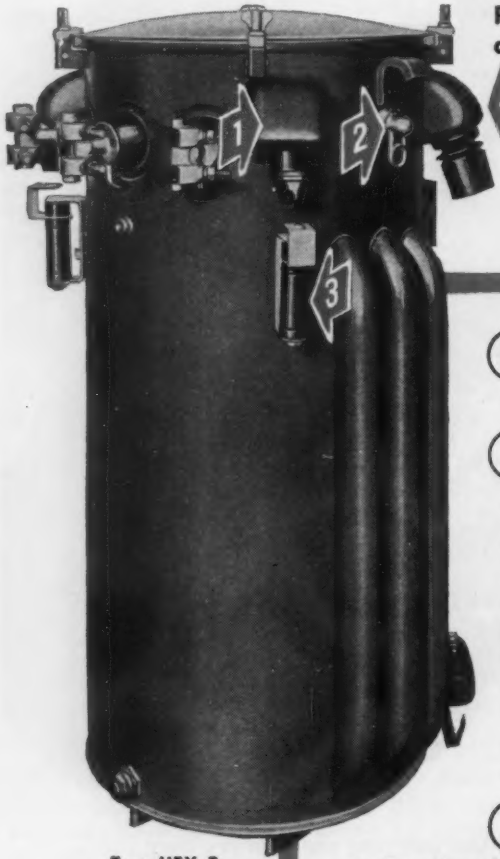
SELF-PROTECTED
DISTRIBUTION TRANSFORMERS

Maximum savings are realized through the use of Wagner Self-Protected Distribution Transformers because of their improved design, high-quality construction, ease of installation, and high efficiency – a combination of superior characteristics which assures users of low operating and maintenance costs.

Two of the outstanding Wagner Distribution Transformers are the types HEX-P and HEBF-P illustrated. These transformers embody the following features to meet the requirements for surge and overload protection.



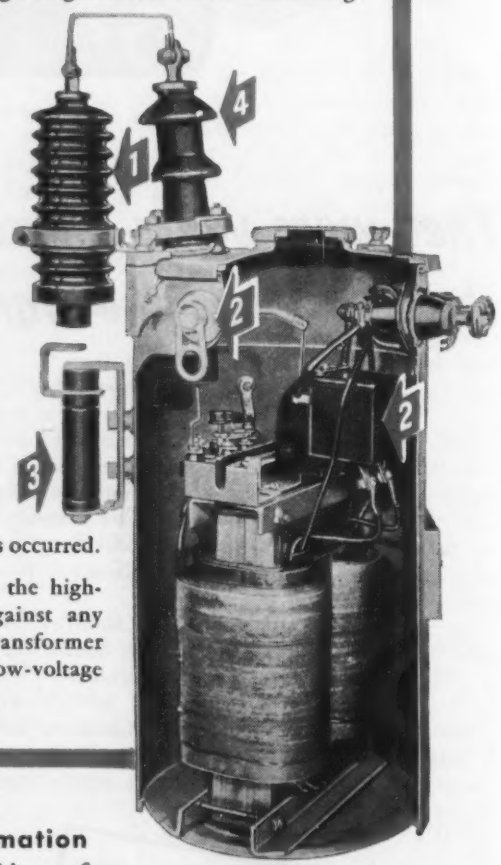
Type HEX-P, 50-kva Distribution Transformer

(1) De-Ion Gap protects transformer against surges. The ability to discharge extremely high surge currents is its outstanding characteristic.

(2) Secondary circuit-breaker protects transformer from secondary short-circuits and overloads. Circuit breakers with overload warning signal-light are furnished on 5-kva sizes and above. 1½ to 3-kva sizes are equipped with breaker only. Breaker reset handle is easily accessible. When furnished, warning signal-light is built into the reset handle.

(3) The De-Ion Gap is isolated from the ground series-resistor by a gap. The external series-resistor is furnished in order to limit the power-current which may flow after a surge has occurred.

(4) Protective links are placed in series on the high-voltage side to protect the feeder against any short circuit that might occur in the transformer windings. The fuse is coordinated with the low-voltage circuit-breaker.



Type HEBF-P, 3-kva Distribution Transformer

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The Obligation of Management and Labor to Cooperate... in War... in Peace

The Invasion is on! We have unleashed our full might for military victory. We have confidence that our great strength will bring success. We are strong because we have achieved unity in mobilization and in combat.

Though victory appears assured, we cannot rest until we have done everything in our power to speed the day when death and destruction are halted.

The home front is an important factor in this time element, for the fighting power of our Armed Forces depends upon their weapons. Napoleon's army fought "on its stomach"—man against man. Eisenhower's men fight on their tonnage—tanks, artillery, machine guns, heavy bombers.

As never before in the long succession of wars, the legends of heroic deeds on the battlefronts in this world conflict will be paralleled in history by the great accomplishments on the production fronts. Along with these heroic achievements of our Armed Forces, the world will long remember the record of our production accomplishments which have made us the stongest military power in the world, as well as the arsenal of democracy.

As the conflict reaches its climax, as battles grow fiercer and more destructive, our responsibility becomes greater and more critical. We must coordinate our productive efforts with the same ingenuity and the same precision with which our Armed Forces have coordinated theirs. We dare not waste the productivity of a single man or machine in these critical days.

As our landing craft are discharging our fighting men on the beaches of Europe and the Pacific, they must not want for equipment. No interference with war production for any reason can be justified. There must be no picket lines in America!

The landing of American troops in France virtually has stopped all strikes in the United States. This is important and encouraging news because the prelude to Invasion, unfortunately, has been an epidemic of strikes. Time lost through strikes, during the first four months of 1944, was double that lost during the same period last year. April saw more strikes than any other month since Pearl Harbor, and in May the record again was broken. Here is what happened within two weeks in May:

> Nine thousand men in six Chrysler plants in Detroit were out when a jurisdictional dispute in a "soda pop" war between the American Federation of Labor teamsters and the Congress of Industrial Organizations fired their discontent.
>
> A three-day sit-down strike occurred among 950 employees in the B. H. Aircraft plant over the refusal of the company to discharge a superintendent unsatisfactory to the union.
>
> Thirteen hundred men in the Chevrolet transmission and axle plant at Saginaw struck over a no-smoking rule and a change in shift-starting time.
>
> Two thousand employees at the Browne and Sharpe Manufacturing Company walked out when a woman was hired to fill a job long held by a man.
>
> Production of penicillin, blood plasma, and other medical supplies was halted at two Detroit plants of the Parke Davis Company as 1900 employees struck for a ten-cent raise.
>
> Over 25,000 lumber workers in the Pacific Northwest struck because the War Labor Board denied their demand for a wage increase.

At the end of the third week of May, 70,000 workers in 26 plants in Detroit were idle because of strikes.

Strikes in Detroit alone reduced production as much as a moderately successful German air raid would have done. Far more important than their effect on output is the effect of strikes upon national unity and morale. To our home front and to our Armed Forces, strikes belie our pledge to back the attack with all the power at our command. Hence, strikes limit our all-out war effort.

Prompt and decisive action is needed to keep America free from strikes for the remainder of the war. Stoppages of work on the production lines cannot be condoned while lives are being lost in fighting the enemy.

Most union leaders realize this need and are preparing to impose discipline upon their members who violate the no-strike pledge. The Warehouse Division of the International Longshoremen's and Warehousemen's Union (C.I.O.) recently declared: "Strikes in this time of war are treason against the nation and betrayal of the interests of labor." A message sent by William Green to all heads of American Federation of Labor unions stated:

> "D-day is here. From now on until Hitler is finally crushed, every worker enrolled in the army of production must consider himself a part of the invasion forces of the United States and conduct himself accordingly. I call on you in the name of the American boys who are risking their lives under enemy fire to maintain uninterrupted production under any and all circumstances. Until victory is won every worker must give the same all-out service that our Armed Forces are giving on the field of battle."

Strongest of all was the appeal of R. J. Thomas, president of the United Automobile Workers, to members of his union:

> "Our union cannot survive if the nation and our soldiers believe that we are obstructing the war effort . . . there can be no such thing as legitimate picket lines . . . I appeal to our membership. If you value your union, if you want to live and serve after the war, we must restrain ourselves and our hot-headed brothers today. If we do not, there will be no union after the war."

Union officers are entitled to vigorous support from management and government in their efforts to prevent strikes. Behind many a strike is an accumulation of unsettled grievances. Managements are overworked, and many union shop stewards are new and inexperienced and do not always do their part in turning down cases which lack merit. Both of these conditions make it easy for large backlogs of unsettled grievances to pile up. A special drive to clean up unsettled cases and to prevent new accumulations of them is one way by which managements and local union officials can help shorten the war.

The government too has a contribution to make to the prevention of strikes—both through the prompt disposal of disputes and through firm action against the leaders of strikes. The National War Labor Board and the Regional Boards are disposing of over five thousand cases a month and have made an excellent record in reducing their backlogs. Nevertheless, the boards still have many old cases; and about one out of four strikes has been an effort to get action from one of the labor boards. The boards are entitled to cooperation from employers and unions in keeping down their docket. In instance after instance, cases are dumped in the lap of the board before the union and employer have made a real effort to get a meeting of minds and to work out settlements.

In the present emergency, strikes are an expression of the lack of adequate understanding and team work between unions and management. Any future great upsurge in industrial strife likewise will be due to misunderstanding. After this war this country must not go through another "1919" when the time lost from strikes reached an all-time high. With 13 million workers, or almost half of the non-salaried employees of the country, in trade unions, the power and prestige of unions is greater than ever. ***The long-run prosperity of the country requires that business and labor learn how to cooperate in supporting the policies which produce the largest possible profits and the largest possible payrolls.***

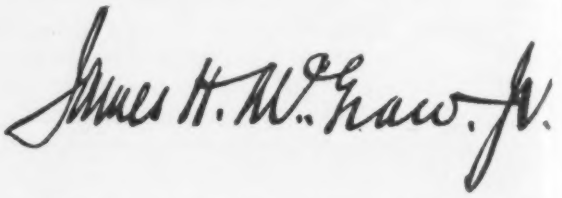
Although business is primarily interested in the largest possible profits, and labor is primarily interested in the largest possible payrolls, both objectives call for the same basic conditions. Payrolls depend upon the prospects for profits. If bad relations between business and labor or unwise public policies cause employers to take a pessimistic view of the outlook for profits, both employment and payrolls will be depressed.

Individual unions and individual employers always will have differences over wages and hours and the status of labor in particular plants or in particular occupations. Some disputes on such issues are inevitable, but resort to arbitration and calm intelligence can help greatly in avoiding strikes in the long run. Cooperation between labor and management is an economic necessity. In our kind of economy, payrolls and profits ***both depend upon the willingness and the ability of business and labor to work together in creating the conditions under which enterprise flourishes.***

The foundation for intelligent and effective cooperation must be accomplished by skillful and imaginative managers in plants throughout the country who are willing to help unions with their problems, and who are able to interest union leaders and their members in the problems of business. Union members and their leaders are keenly interested as a rule in the efforts of management to win new markets. They know that jobs depend upon the success of managements in improving the product, adding new items to the line, and, less frequently, cutting costs and prices. Employees like to be kept informed about what management is doing, what problems it is meeting, and what success it is having. Most of all, they like to have an opportunity to contribute their ideas and suggestions.

The recent epidemic of strikes should not blind us to the fact that even today there are more plants where managements and unions are on good terms than ever before in the country's history. Consider, on the one hand, the extensive and constantly growing efforts of unions to train and develop shop stewards and, on the other hand, the efforts of employers to teach foremen how to carry out the new responsibilities imposed upon them by union agreements. Unions and managements together are learning how to operate together such technical devices as time study and job evaluation. Managements which, several years ago, opposed the provision of umpires to interpret union agreements and to settle deadlocked cases today are taking the lead in suggesting such arrangements.

The war is reaching a crisis, and all groups in the country must be aware as never before of their common interests. This presents an opportunity which should be seized to lay the permanent foundations for more effective team work in American industry. Let history record that the days when Europe was being liberated also were the days when unions and employers were making unprecedented progress in preparing American industry for the return of the service men by developing policies of cooperation between business and unions. Such cooperation will help achieve a peace worthy of our efforts and our sacrifices.



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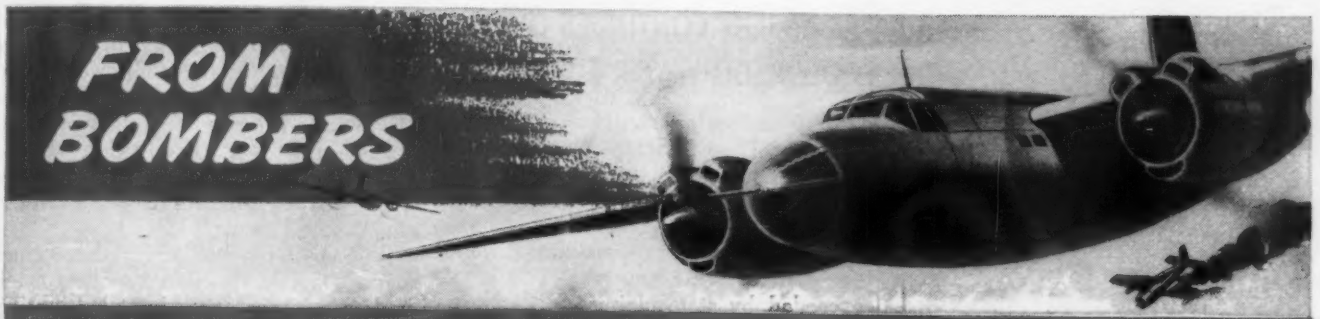
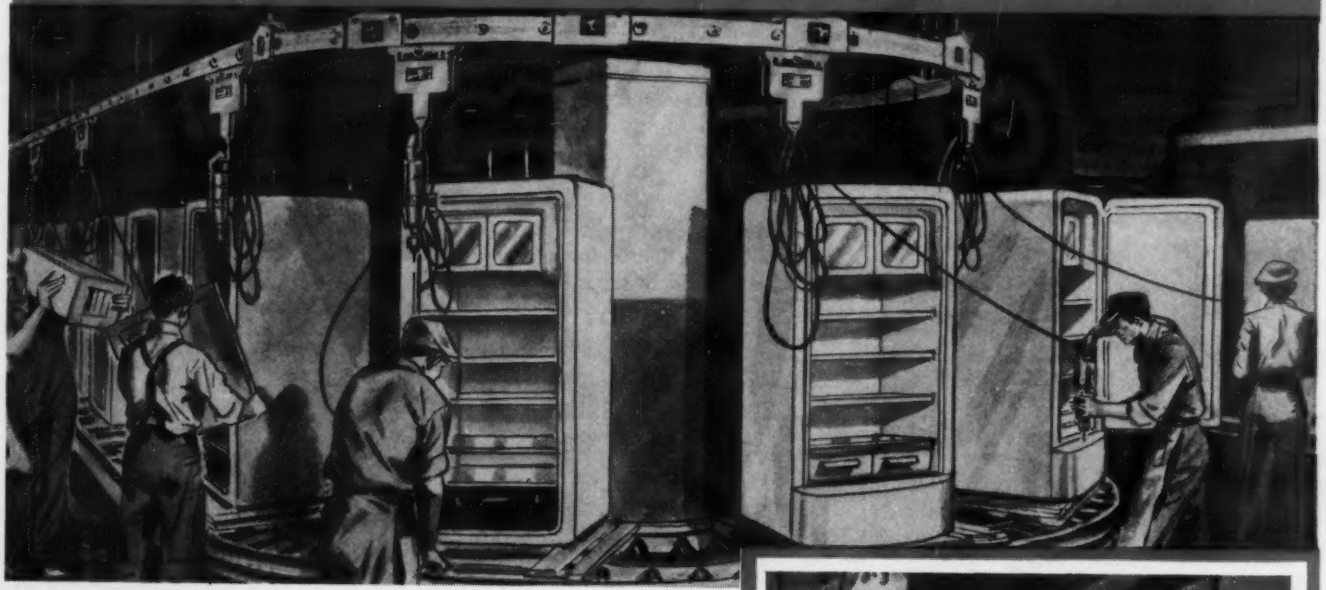


... BACK TO PEACETIME PRODUCTS



BullDog Will Speed Reconversion

There's a big peacetime job ahead for portable tools, cranes, hoists and other "moving loads" . . . as big a job as they have had in the last three years of war production.

And, when reconversion starts, plants equipped with BullDog Industrial Trol-E-Duct will find their mobile power problems solved.

Only Industrial Trol-E-Duct has fully met the need for safe, convenient, flexible power that travels along with the tool or other moving load. Like other BullDog bus duct systems, it can be quickly moved to any location — readily adapted to any shop set-up.

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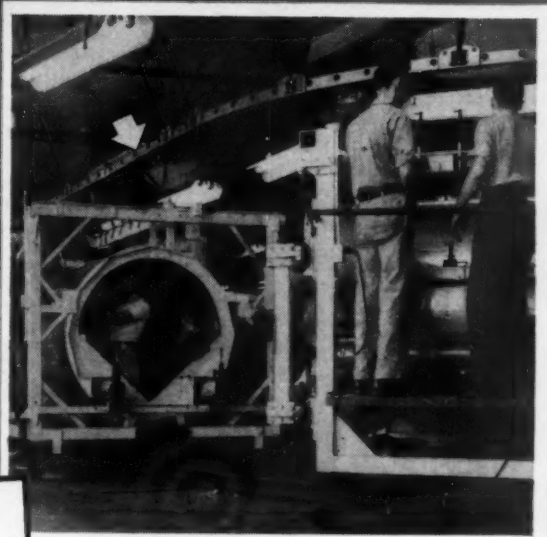

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WET FLASHOVER . . . . . 35 Kv.
M & E STRENGTH . . 15,000 Lbs.
SPACING . . . . . 5¾ In.
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• Here's a sturdy 7½" diameter strain unit commonly used for distribution dead-ending which has all the high quality characteristics of the larger 10" disc insulators.

• The 1199-B porcelain corrugations are ample in thickness to withstand rough handling during construction or malicious or accidental breakage on the line, yet are rounded deep enough to allow full leakage surface.

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ARGUMENT CONTINUES OVER COLORADO WATER SUPPLY

With a heated controversy on the pending United States-Mexico water treaty splitting the eight states affected, J. R. Ritter, assistant director of the USBR project planning branch, stated in a recent report that the Colorado River water supply already is exceeded by state claims. Ritter's report was given at a meeting in Reno of the Colorado River Committees of Fourteen and Sixteen.

The treaty, which would give Mexico 1,500,000 acre-feet of Colorado River water annually, as well as water of the Tiajuana and Rio Grande, is approved by Arizona, New Mexico, Wyoming, Utah and Colorado. California and Nevada are opposing the treaty on the ground that there is not now sufficient water to allow completion of lower basin states' projects.

While Bureau of Reclamation officials took no stand in the controversial issue, they submitted their surveys for the states' information.

Idaho Starts Survey Under Columbia Power Program

Surveying the Salmon and Snake rivers in Idaho for multiple use dam sites as part of a Columbia Basin power program being studied by the government, eight civilian army engineers recently completed a 260-mile 12-day boat trip, the only available transportation through the mountainous region.

As a result of the preliminary study, a detailed survey of power possibilities of the area will be made by another engineering party later in the summer. In the meantime, aerial photographic studies are planned.

Heading the party was O. L. Hoffman of the Portland, Ore., district engineering division. Others were L. E. Rydell, K. M. MacDuffee, F. O. McGrew, C. W. Wagoner, C. O. Greenwood, Jr., S. E. Sporseen, engineers and L. L. Ruff, geologist.

Seattle Acts to Secure Manpower for Dam Project

Shutdown of work on the second step of Seattle City Light's Ross dam, with a resultant loss of about 300,000 kwh. of potential electric energy, is considered a strong possibility as a result of acute shortage of manpower in the Seattle area.

Warning that cessation of work on the $10,000,000 Skagit river project may become necessary unless a higher manpower priority rating is granted for the job was contained in telegrams forwarded to War Manpower Commissioner Paul V. McNutt, President Roosevelt, Interior Secretary Harold Ickes and War Production Board Chief Donald M. Nelson by Congressman Warren Magnuson of Washington.

Pouring of concrete for the second step of the dam is slated to be started in late summer or early fall. Lighting Superintendent E. R. Hoffman of City Light has already warned that, in order to proceed with the work, the contractor, General Shea-Morrison, will find it necessary to at least double the present crew.

Edison Company Sets Aside Second Generator For City

A newly installed generating unit in Southern California Edison Co.'s Long Beach plant has been made available to the Los Angeles Department of Water and Power through an agreement recently approved by the California Railroad Commission. The unit has a gross capacity of 86,300 kw. at 60 cycles.

Since 1932, Southern California Edison has set aside and operated a 60,000-kw. generator in its Long Beach No. 2 plant for the City of Los Angeles for a compensation of $575,000 plus costs of fuel. Payment for the additional electric power will be made on a daily basis at the same rate, allowing for differences in capacity of the units.

Also provided for in the agreement is an exchange of electric energy between the two systems through interconnections in order that maximum service may be obtained from existing electric facilities in the industrial area.

Los Angeles To Take More Energy from Boulder Dam

Approximately 268,252,898 kwh. of additional unused energy from Boulder Dam will be purchased by the Los Angeles Department of Water & Power during the current fiscal year. The purchase is a cut back from the 1,190,000 kwh. contracted for by the Defense Plant Corp. and released due to production curtailment at the Basic Magnesium plant in Las Vegas, Nev.

The contract was arranged following consultations between the department, Southern California Edison Co. and Secretary of the Interior Ickes. The additional power, which will be at the firm rate of .00124 per kilowatt-hour, will displace steam plant energy.

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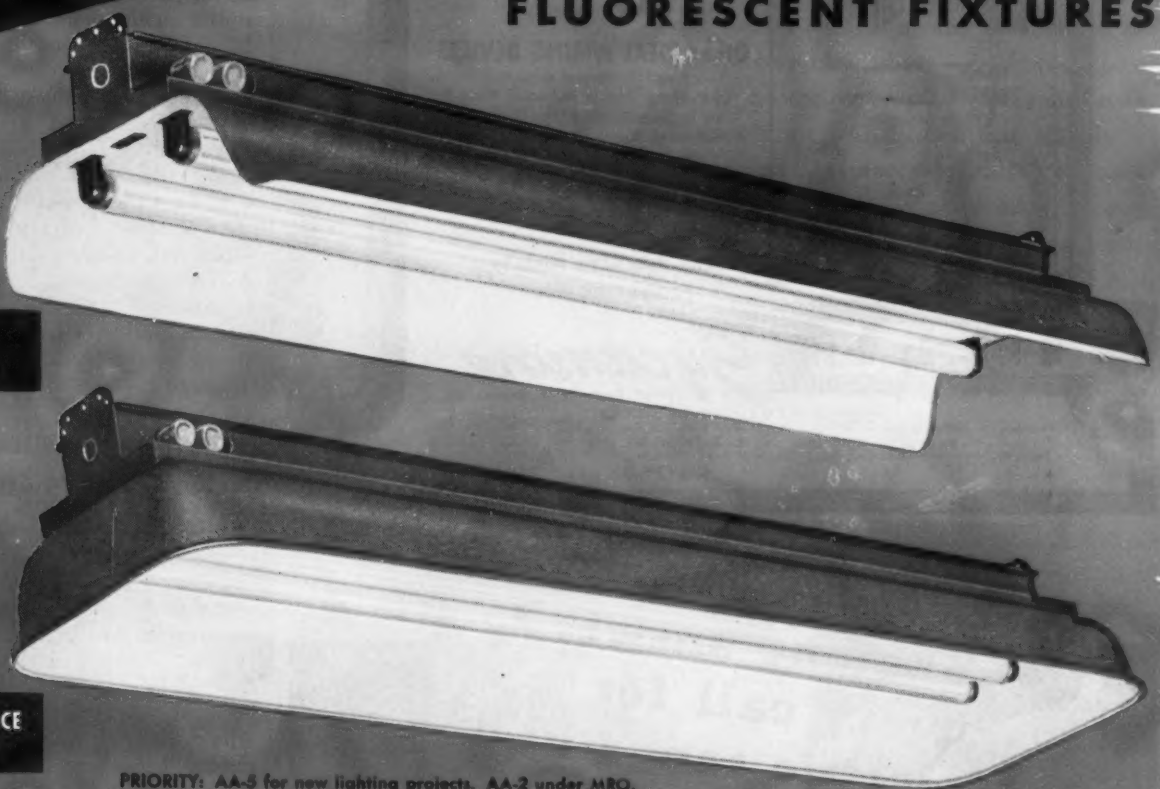

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- 2-40 watt, 3-40 watt and 2-100 watt models.
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FUEL OIL CUT INCREASES POWER SHORTAGE IN B. C.

A 75% cut in fuel oil allocations to the B. C. Electric Railway Co. steam plant at Vancouver was ordered last month by the federal oil controller. The curtailment intensifies the threat of a power shortage in the area, since the company had been operating the plant at capacity to conserve water.

Under the order, fuel oil used in generating electric power for the city must be reduced from 50,000 to 12,000 barrels a month. This will cut output at the steam plant from 9,000,000 to 2,250,000 kwh. monthly.

To help avert the power shortage threatened by poor water conditions, B. C. Electric has arranged to take power from the Northwest Power Pool through the Puget Sound Power & Light Co. system. Expected benefit of 1,000,000 kwh. a month will be wiped out, however, by reduced output at the steam plant.

Company officials indicated non-essential industry would be called upon to use less power, should the present shortage become more serious.

Water Conditions Improve In Some Western Areas

Above normal rainfall during June improved stream flow and brought relief from drought conditions threatening several sections of the West, it was reported in the USGS water resources review. Whereas stream flow during May was normal or above in only 30% of the 11 Western States, it was above normal in 45% of the West during June.

In the Gila River Basin in Arizona and the Columbia River Basin, however, stream flow continued seriously subnormal. Representative streams in the upper Gila basin have been subnormal for about a year. All tributaries of the Columbia were below normal, with some nearing record lows.

In eastern Oregon and in Utah, Idaho, Montana and northern Nevada, rainfall was above normal. California experienced relatively low flow in streams dependent on snow-melt, due to continued cool weather.

● POWER PRODUCTION of 348,980.721 kwh. by the Salt River Valley Water Users Assn., Phoenix, Ariz., for the first half of 1944 broke all previous records, according to Harry J. Lawson, general superintendent. Power generated, originating from the association's hydroelectric, diesel and steam plants and Parker Dam, amounted to a 4% increase over the same period last year.

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Type EA Cutouts provide a positive drop-out action which means that faults are completely cleared . . . equipment positively protected in case of short circuit. Cutout door with blown fuse link is removable and replaceable entirely by hook-stick, completely safeguarding linemen.

Your Westinghouse distributor can supply EA Cutouts in either drop-out or non-drop-out styles, or with substitute disconnect blades for converting cutouts into disconnect switches. Call on him for prompt, competent help and recommendations.

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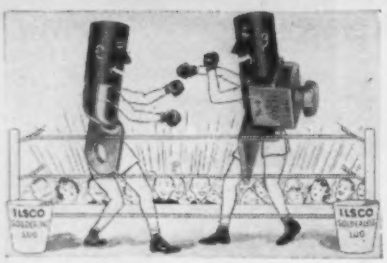

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NBC TO BUILD SHORT WAVE STATION IN CALIFORNIA

Short-wave broadcasting facilities to serve the Far East, Pacific area and Latin America will be constructed at Dixon, Calif, by the National Broadcasting Co. The $1,000,000 station is being built for the Office of War Information, with Defense Plant Corp. financing.

When the plant is put into operation next fall, it will make San Francisco one of the largest short-wave distributing centers in the world. It will consist initially of four 50-kw. transmitters tied together as two dual transmitters, but two of the units may be stepped up to 200 kw. in the near future.

Construction will be supervised by Carl G. Dietsch, NBC engineer, who was in charge of design and construction of the company's shortwave plant at Bound Brook, N. Y. Dietsch will remain at the plant, in charge of technical operations, since NBC will operate the station for the OWI Overseas Branch.

Long Delayed Antimonopoly Suit Will Come To Trial

The federal government's four-year-old antimonopoly suit against the San Francisco Electrical Contractors' Assn., Inc., Electrical Industry Depository of California, Inc., and 43 other defendants has been set for trial on Aug. 15 in Federal Court in San Francisco. Seven corporations, eight labor union officials, 19 contractors and seven corporation officers are to be tried after continuous postponements of the case by the Department of Justice. The case promises to touch on a debated issue of states rights and federal jurisdiction.

● First Prize in the metropolitan group classification of the 1944 Better Copy Contest, sponsored by the Public Utilities Advertising Assn., was won by *Edison News*, employee newspaper of the Southern California Edison Co., edited by Mary Shoop. This is the first time *Edison News* has been entered in the competition, since 1943 was the first consecutive 12 months of publication.

● West Oregon Electric Cooperative, Vernonia, has received a $460,000 allotment from REA funds. Eventually the coop will have 227 miles of line, serving 1,587 members. The allotment includes $188,250 for acquisition and rehabilitation of two generating plants and 77 miles of existing line.

Answer to "Who Am I"
Charles Grunsky
(See Page 84)

Engineers To Hold Technical Meetings On Pacific Coast

Pacific Coast technical meetings of the American Institute of Electrical Engineers, this year, are to be held in Los Angeles, beginning Aug. 29 and continuing until Sept. 1, inclusive. The Biltmore Hotel has been selected as headquarters, with additional accommodations available at the Savoy, San Carlos and Clark hotels.

The program stresses the activities of the aircraft electrical engineer and his relation to the important part aircraft is playing in the progression of the war. Full details of the complete technical program and student sessions will be announced from Institute headquarters.

Hotel reservations are being handled by Ray F. Gheen, Ohio Brass Co., 417 S. Hill St., Los Angeles. T. M. Blakeslee, Department of Water & Power, City of Los Angeles, is general convention chairman and G. R. Woodman, Southern California Edison Co., will handle registration.

● WARTIME operating problems and postwar expansion were discussed by delegates at the recent sectional meeting of the Northwest Public Power Assn. at Spokane. The 20 delegates present agreed that, by expansion, was meant not only improvement of facilities but also increased use of power based on research now underway. Membership in the association includes 137 public power organizations in the four Northwest states. B. R. Lean, Chelan, is president; J. W. McArthur, superintendent of the Eugene, Ore., municipal electric system, is vice-president; and E. R. Hoffman, Seattle City Light manager, is secretary-treasurer.

● THE NINTH ANNUAL Conference of the International Association of Electrical Leagues will be held at Detroit, Sept. 20-22. Development of plans to provide postwar jobs is on the agenda.

● IES HAS scheduled a technical conference at the Edgewater Beach Hotel in Chicago, Sept. 14-16. Military developments in lighting, new standards and postwar plans will be discussed.

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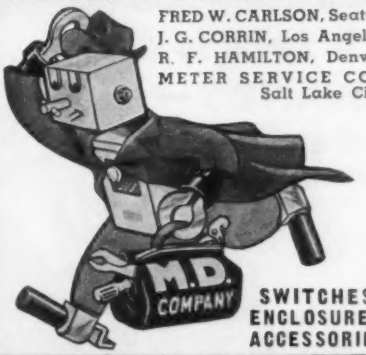

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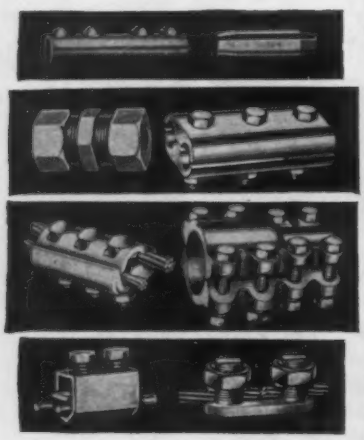

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PG and E Appoints Area Heads in New Set-up

Division of Pacific Gas and Electric Co. territory into three operating areas, northern, central and southern, and appointment of area superintendents was announced by the company last month. Area superintendents will work under the direction of the vice-president in charge of operations and through division managers and superintendents. They will direct construction, operation and maintenance of physical properties.

In the northern area, electric, water and steam properties will be under direction of F. R. George, engineer of electrical operation, as area superintendent.

D. D. Smalley, former general superintendent, San Joaquin Power division, will be area superintendent for the central area. He will have his headquarters in San Francisco, and will be assisted by George H. Hagar, assistant engineer of operation.

G. A. Peers, formerly superintendent of the Stockton division, becomes southern area superintendent, with headquarters at Fresno. He will supervise the San Joaquin properties.

Pollard Making Engineering Studies in California

James F. Pollard, who resigned recently as president of the Seattle Gas Co., is making special engineering analyses for the executive engineer's department of Pacific Gas and Electric Co. Pollard resigned from the Seattle company at the beginning of the year, when illness in his family compelled a move to California.

During his entire career, Pollard has been identified with the operation and regulation of utility properties on the Pacific Coast. His first job after being graduated from the University of California in 1912 was as draftsman with PG and E. Later he was transferred to the company's construction department and helped build Drum power house, becoming operator when the plant was completed. He left in 1915 to become assistant engineer with the California Railroad Commission.

In 1918 he went with the Sierra and San Francisco Power Co. as commercial manager and, when that company was taken over by PG and E, he left to become manager of the Coast Valleys Gas & Electric Co. In 1930 he went to Seattle as general manager of the gas company.

SMALLEY

● In the East to attend a meeting of the WPB incandescent lighting fixture committee, of which he is Western representative, L. A. Hobbs, Smoot-Holman Co., Inglewood, Calif., also went to meetings of the Fleur-O-Lier advisory board and the NEMA Underwriters' Code Committee. The Fleur-O-Lier manufacturers discussed establishment of minimum standards on certain types of lighting equipment as a protection to the public, he reports, and the NEMA committee was discussing clarification of Code rulings necessitated by rapid development in lighting equipment.

● W. C. Walsh has been appointed a district representative for the General Electric electronics department, with headquarters at San Francisco. Walsh had been associated for several years with the U. S. Department of Agriculture as electrical design engineer. Previously he was with G-E Supply Corp. for eight years as sales engineer. In his new assignment he will cover ten Western states assisting in application and maintenance.

● Arthur E. Schanuel, who has made many trips to the West as field representative for the National Adequate Wiring Bureau, has resigned from the NEMA post to become executive secretary of the Indoor Climate Institute.

● Clarence Sherman, former assistant personnel officer of Puget Sound Power & Light Co., Seattle, has been advanced to personnel officer.

CHECK the FACTS

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2. Saves sectionalizing fuse outages.
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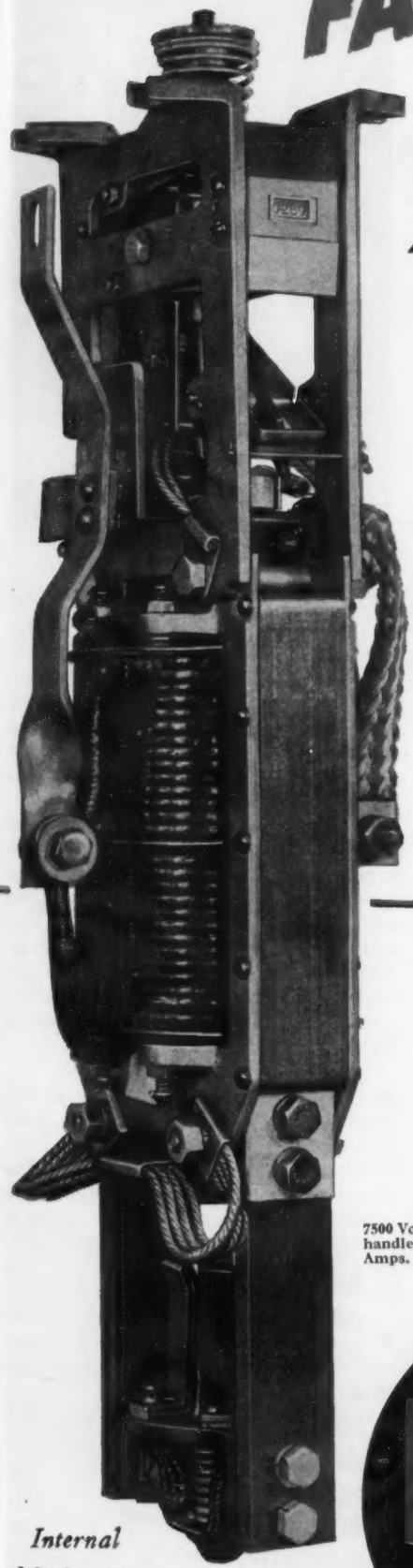

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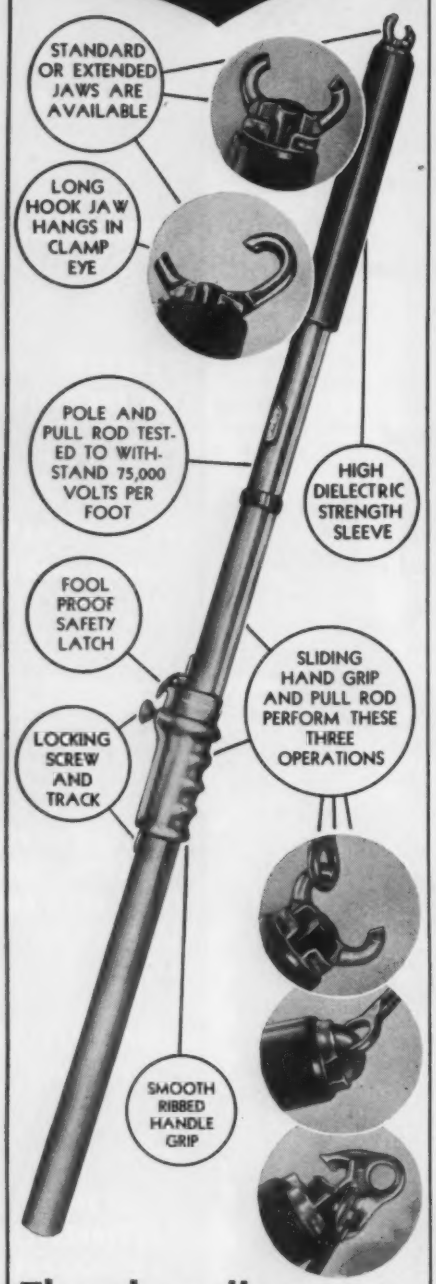
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TIPS TOOLS

Montana Power Names Corette Vice-President

John E. Corette, Jr., for the past ten years legal counsel for the Montana Power Co., was elected vice-president and assistant general manager of the company by the board of directors at its annual organization meeting in June.

Other officers, all re-elected, are: Frank W. Bird, president and general manager; M. E. Buck, vice-president and general superintendent; John C. Ryan, (now in service) vice-president; S. P. Hogan, secretary and assistant treasurer; J. R. Thomas, treasurer; J. R. Sullivan, assistant treasurer; and C. J. Commons, assistant secretary.

Corette, a native of Butte, Mont., attended the University of Montana at Missoula and was graduated from the University of Virginia law school. He was admitted to the Montana bar in 1929.

For four years after his graduation, he was a member of the law firm of Murphy and Whitlock (now Murphy, Garlington and Pauly) in Missoula. He then returned to Butte to enter the firm of Corette and Corette.

CORETTE

Don C. Ray Retires from Pacific Gas and Electric

Don C. Ray, popular and widely known manager of the public relations bureau of Pacific Gas and Electric Co., San Francisco, retired, July 1, as quietly and self effacingly as he had conducted his entire electrical career. It began about 1901, at Grass Valley, Calif., after the young Don Ray had left his native Oregon and been graduated from Oregon Agricultural College.

His first job was with the Nevada County Gas & Electric Co. and it consisted of just about everything. In 1911 he was assistant manager of what had then become the Grass Valley district office of Pacific Gas and Electric (which had taken over the pioneer company), when he was made district manager of the Contra Costa district at Martinez. In 1920 he left that company to go into another business but returned in 1921 as electric sales manager at headquarters in San Francisco.

In May 1927, he was made manager of the public relations bureau of the sales and public relations department, which position he held until his retirement July 1, 1944. In his contacts throughout the state he is counted a friend by the thousands he has met and worked with. He is a past president of the Electric Club of San Francisco and was recently made one of its very few honorary members for life.

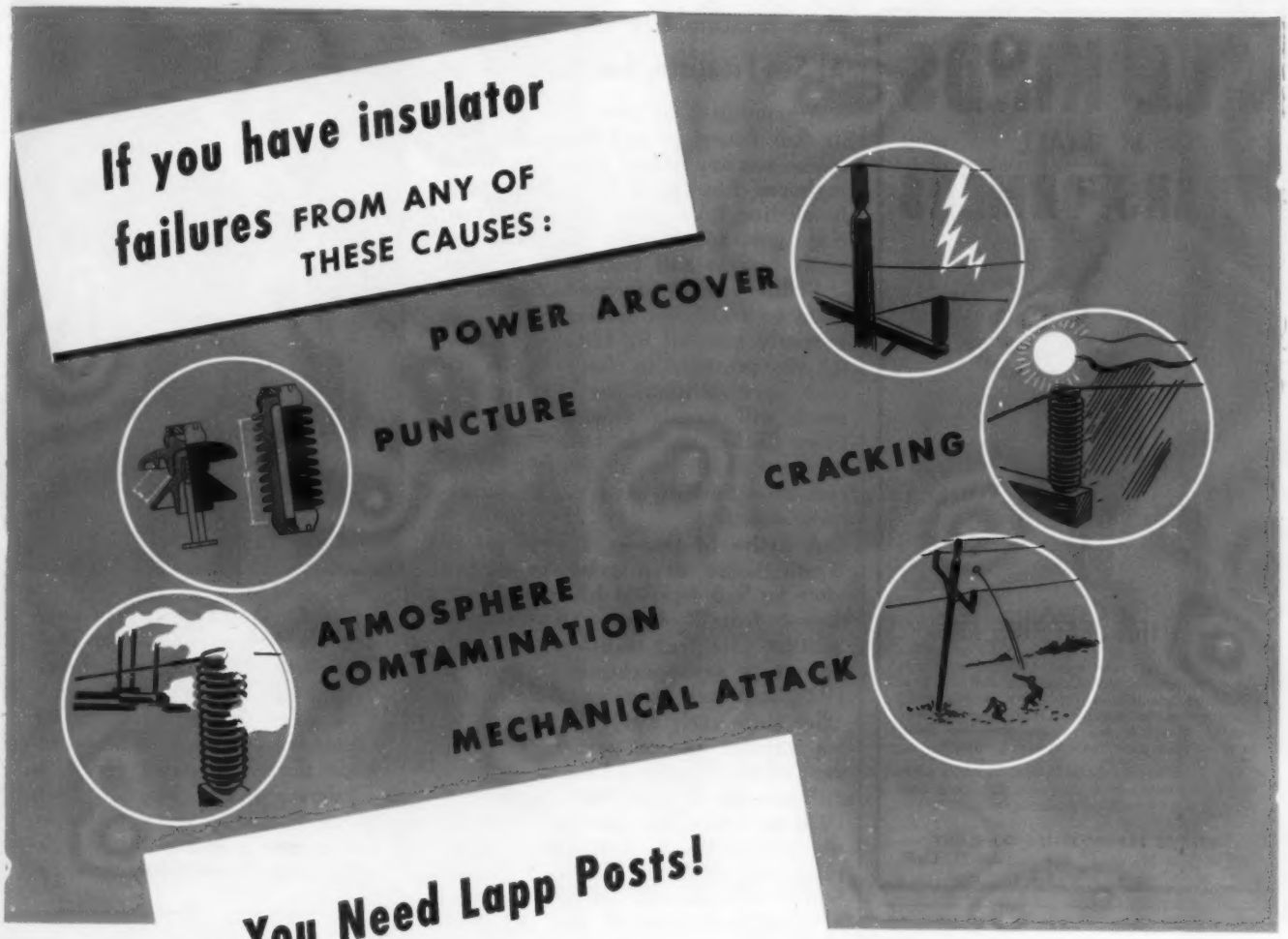
His work at Pacific Gas and Electric is being taken over by E. A. Long, who has been assistant manager of the bureau under Ray.

● C. P. W. SCHWENGERS, Vancouver, has been elected president of McLennan, McFeely & Prior Ltd. Schwengers was managing director of the hardware company, which operates wholesale branches in Vancouver, Victoria, and New Westminster and has retail stores in most of the larger centers of British Columbia. His appointment follows the vacancy created by the death of Andrew Houstoun.

● L. W. NIMS, personnel director, Utah Power & Light Co., has been appointed president of the Utah Post, Society of American Military Engineers. The unit has appointed a committee to cooperate with postwar planning groups, since military problems are involved in many of the plans.

● LEROY M. EDWARDS, vice-president of Pacific Lighting Corp., and general chairman of the Los Angeles Citizens Manpower Committee, recently was named a member of the Southern California Management - Labor Committee of the WMC, succeeding Kenneth T. Norris, who resigned.

● R. D. HYNEMAN has been named Graybar commercial manager at Portland. With the company for 27 years, Hyneman has spent most of that time in Portland, Seattle and Tacoma. Most recently he had been office procurement advisor at Portland.



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New Westinghouse Managers At San Francisco, Salt Lake

Appointment of new managers for its San Francisco and Salt Lake City offices was announced Aug. 1 by Westinghouse Electric & Mfg. Co. Frank E. Bodine takes over the San Francisco post and Stanley M. Johns succeeds him at Salt Lake City.

Bodine was transferred to San Francisco to take over managerial duties formerly handled by Charles A. Dostal, vice-president in charge of the Pacific Coast division. The new appointment will enable Dostal to devote more of his time to other company business in the eight Western states comprising the division, the announcement stated.

A native of Denver, Bodine joined Westinghouse as a graduate student after he had received his engineering degree from Colorado State College in 1926. He was transferred to Salt Lake City as application engineer in 1928, and has been manager of the office since early 1941. At the time of his transfer, he was serving as president of the Electrical League of Utah.

Johns also joined the company in 1926 as a graduate student. Later he was sent to the St. Louis office as application engineer for the Central Station division. He left the company in 1933 but returned and, in 1941, was sent to Salt Lake City as application engineer. He was assigned to handle company details in connection with the Geneva Steel and Utah Copper projects.

● A. S. DICKERSON, General Electric Co. lighting engineer who designed the spectacular lighting at the Golden Gate International Exposition in 1939-40 at San Francisco and was also instrumental in the lighting of the 1915 Panama-Pacific International Exposition at San Francisco, has just been presented an honorary degree of Doctor of Engineering by Texas A. & M. College, from which he was graduated in 1910. The award was made for "distinguished service in the field of illumination, particularly for the part he has played in bringing beauty and harmony to the lighting of the great expositions of two decades." He also did important work in the Brazilian Centennial of 1922 and the Chicago Century of Progress of 1933. He was chairman of the street and highway lighting committee of the Illuminating Engineering Society 1921-44.

● C. B. SCHOEGGL, of Bremerton, Wash., has been promoted to the position of assistant treasurer of the Puget Sound Power & Light Co. in Seattle, replacing C. A. Durham, who has been moved to statistical engineer in the treasurer's office.

Frank C. Angle, who has been named manager of Allis-Chalmers district offices, with headquarters in Milwaukee. A native Oregonian, he returned to the Coast ten years ago as San Francisco district manager for Allis-Chalmers and a year ago was made Pacific regional manager. He is past president of the Pacific Coast Electrical Association.

Alden, Nourse Given New Posts With Westinghouse

Walter A. Alden and Randle L. Nourse have joined the application engineering staffs of Westinghouse Electric and Manufacturing Co. at Los Angeles and San Francisco, it was announced recently by Charles A. Dostal, vice-president in charge of the company's Pacific Coast district.

Alden, for the past 20 years an application engineer in lighting for Westinghouse in both the supply and manufacturing companies at Los Angeles, has been transferred to the agency and specialties division of the parent company there as a lighting specialist, handling industrial, commercial and floodlighting in the southern California area.

Nourse, who has joined the Industrial division staff in the San Francisco office, was power consultant for Southern California Edison Co. nine years. Prior to that, he was associated with the Layne & Bowler Pump Co. in Riverside and San Jose, Calif., and was the Chicago, Ill., representative of the Pomona Pump Co.

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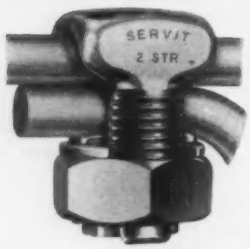

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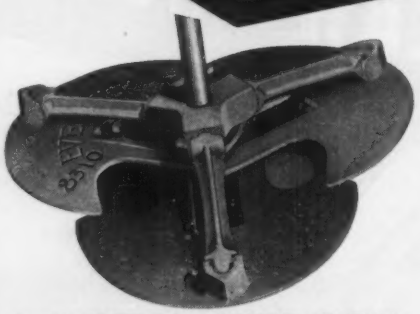

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Electriquiz Answers

See Page 87

1. No. When a modern high-wattage iron is first turned on, current is consumed until the iron reaches the temperature for which the heat control dial is set. The control then turns the current off, and no current is consumed until the temperature of the iron drops to the point where further heat is required to maintain the desired temperature. There is no overheating and no time is lost waiting for the iron to reheat. Stored heat does the job when the current is off. The combination of high wattage to provide capacity and automatic control to use the capacity most advantageously is the efficient formula of the high-wattage automatic iron.

2. The four reasons for the speed of the modern electric iron: (1) Increase input to 1,000 watts (greater heating capacity). (2) Superior thermostat sensitivity (holds temperature setting accurately) (3) Increased sole plate area (larger ironing surface—fewer strokes to do the work) (4) Lighter weight gives more speed with greater ease. Faster heating does the ironing, not weight or arm pressure.

3. Yes. High speed a-c - d-c series wound brush type motors will operate efficiently at correct speeds on either 50 or 60 cycle a-c current and do not require any "cycle change."

4. With thermostatically controlled electric heat, it is possible to make coffee at exactly 205° F. This is the scientifically correct temperature that releases the rich, natural flavor oils in the ground coffee and extracts their full bodied goodness and aroma. A lower temperature gets only part of these essential oils—a higher temperature extracts the caffetannic acid and makes the coffee bitter.

5. All electric motors get warm when running, and warmth will increase as load on motor is increased. The temperature rise causes no harm to mechanical or electrical parts as long as the load and temperature rise remain normal.

6. It will be possible for electronic sorting devices to speedily route mail and other forms and paper-work throughout large business establishments.

Evans Appointed Division Manager For P G and E

O. R. "Bob" Evans, assistant general superintendent of the San Francisco and East Bay divisions of the Pacific Gas and Electric Co., has been appointed Humboldt division manager effective Aug. 1. He succeeds J. W. Coons, who retires after 39 years of service with the PG and E, the last 12 years of which have been spent in Eureka.

Evans started his career with the PG and E in 1909 as a lineman in Santa Rosa. And before becoming assistant superintendent of the company's San Francisco and East Bay divisions in 1940, he had been division superintendent in Stockton for a number of years.

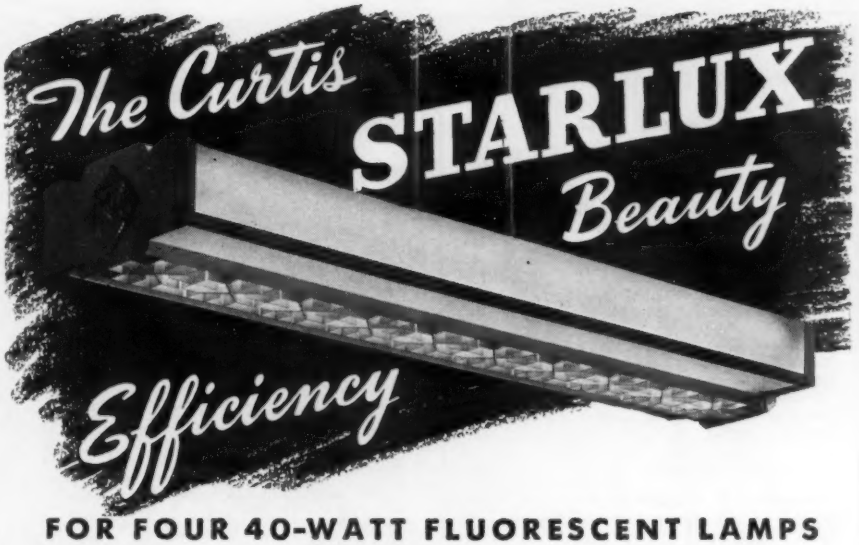
He is a veteran of World War I. He entered the country's military service as a private in the 37th Regiment of Engineers and advanced to the rank of first lieutenant before he mustered out.

● A. C. SCOTT has just been appointed the vice-president in charge of sales for the Apex Manufacturing Co. at Cleveland, Ohio. Scott for nineteen years was with the John Breuner Furniture Co., Oakland, and joined the Apex-Rotarex Co. at its Emeryville plant in 1932. At the outbreak of war he was transferred to the Apex plant at Cleveland as sales manager for the central division and President C. D. Frantz has now promoted him to vice-president in charge of sales.

● S. E. NORTHINGTON, chief traveling auditor, Southern California Edison Co., died June 15 in Los Angeles. Born in Mountain City, Tenn., Nov. 24, 1880, he worked with the Pacific Gas and Electric Co. and the San Joaquin Light and Power Corp. before joining the Edison company in 1919, as an assistant traveling auditor. He was advanced to traveling auditor three months later, and was appointed chief traveling auditor in 1939.

● C. H. IRELAND, 52, for the past 13 years manager of the Victoria, B. C., Branch of the Canadian General Electric Co., died recently. He had been in ill health for two months. Mr. Ireland was born in England and came to Calgary, Alberta, as a boy. He joined the company there 28 years ago and served in the Calgary and Vancouver offices before moving to Victoria.

● E. B. WHIPPLE, 63, for the past 17 years in charge of the service department of the Elko Lamoille Power Co., Elko, Nev., died from a heart attack July 2.



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PROFILES *of the month*

D. H. Capelli, last month named Graybar mechandising manager at Los Angeles. He has been with Graybar since 1934 and moves from Salt Lake City to take over the post vacated by Scott

Sam W. Scott, who recently took over the duties of commercial manager for Graybar in the Los Angeles district. He succeeds W. E. Guy, who was transferred to the company's Chicago office

When wholesalers emerged to meet once more. Snaps by Sylvania taken at the recent meeting of Pacific Division, NEWA, at Santa Barbara; above, W. E. O'Brien, sales manager, McGraw Electric Co., Chicago, with Harry Perl, State Electric Supply, Oakland, chairman, Pacific Division, NEWA, and Art Grove, Steel & Tubes. At right, above, Bart Wickstrum, Sylvania and Morris Hixson, G-E Lamp Dept. At right, Charles G. Pyle, managing director, NEWA. Below, Irving Colwell, Ray W. Murphy, Jim Lavenson, Leon M. Guibara, Carl J. Savasta, John S. Milne. The dining room was filled with such groups

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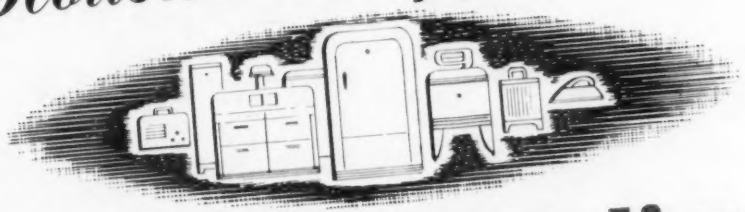
for

Household Appliances



It's a Good Policy

to

DURATIONIZE

with Timely Care and Repair

There are three things you can do to insure longer life and better performance from your household appliances.

1. *Handle with Care.* Your appliances are not as new as they used to be... so give them old-age care. Avoid sudden jars or jolts. Be careful not to overheat or overtax their capacity for work.

2. *Take Care to Stop Wear.* Brush out the collection of dirt and dust that gathers on appliances. Where needed, "doctor up" moving parts with a few drops of oil. Use a screw driver and cinch up loose screws or bolts.

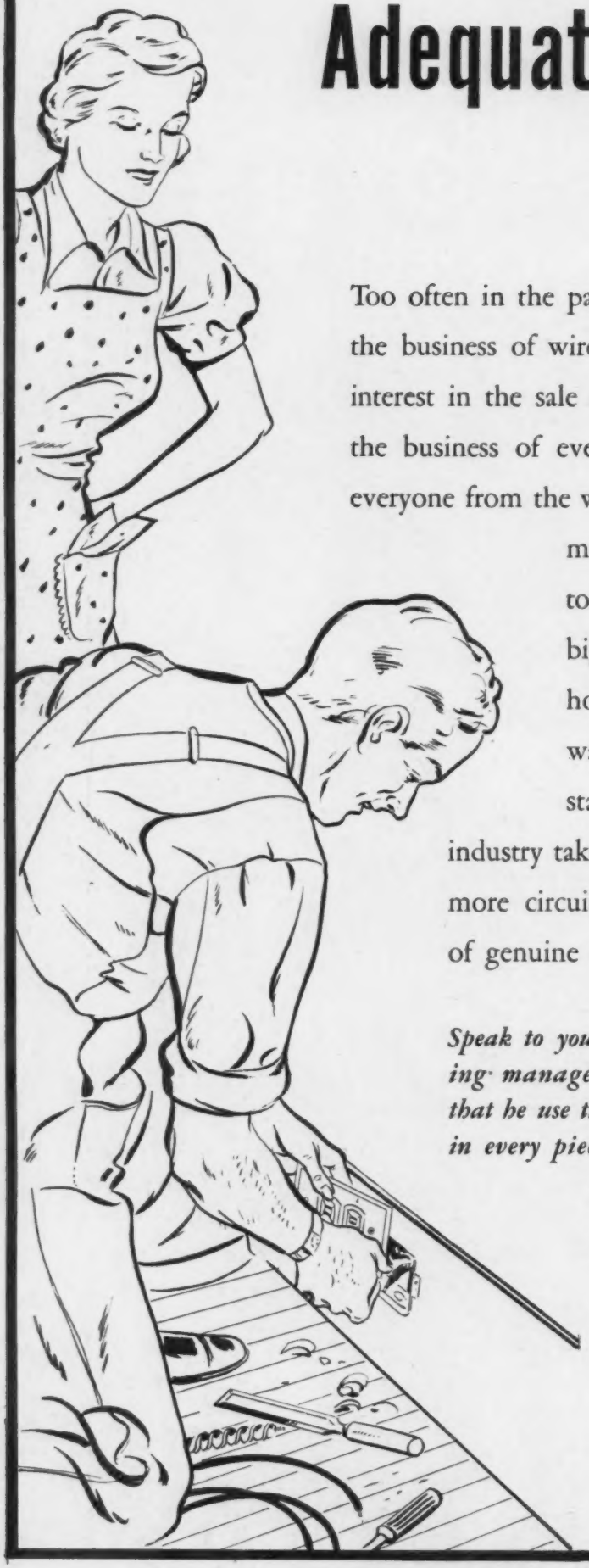
3. *Duration-ize with Timely Repair.* When any appliance begins to "act up" and persists in making funny noises... call a repair man... tell him what the trouble is and get that trouble remedied as soon as possible.

You will probably not be able to buy new appliances for a long time. Take care of what you have. Keep them in repair.

Ask our local office for name of Authorized Service and Repair Dealer.

P·G·&·E

PACIFIC GAS AND ELECTRIC CO.



Adequate Wiring is Business

Too often in the past we have assumed wiring to be mainly the business of wire manufacturers and others with a direct interest in the sale of wire and wiring devices. Actually it is the business of every single element within the industry—everyone from the wiring contractor, to the wholesaler, to the manufacturer of prime movers, to the utility, to the electric appliance department of the big downtown store, to the little neighborhood shop selling pottery lamps and hardware and victory-model toasters. *Everyone* stands to profit—or lose—by the action the industry takes NOW in promoting large gauge wire, more circuits, more outlets and the other essentials of genuine Adequate Wiring.

Speak to your advertising manager. Suggest that he use this emblem in every piece of copy.

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Available in 2, 3 and 4-inch cuts at 85¢ each, and in mats at 20¢ each. Order direct from the National Adequate Wiring Bureau, 155 East 44th Street, New York City.

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